ELECTRICAL REVIEW

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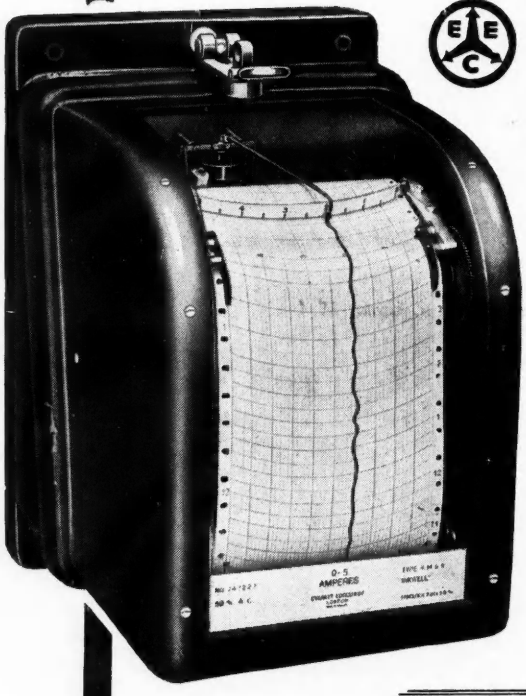

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ELECTRICAL REVIEW

Vol. CXLVII No. 3793 4TH AUGUST, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Commons and Electricity

COMMENDATION AND CRITICISM

LAST week's debate on the B.E.A. and Electricity Boards showed how difficult it is to separate a nationalized business from politics. It is the undoubted right of the House of Commons to keep an eye on electricity supply but vision must almost inevitably be clouded by party considerations. Consequently most of the contributions to the debate from the Government side were in the nature of defence or commendation of the B.E.A. while those from the Opposition benches were generally critical, comparing present operations with those under the previous dispensation, to the B.E.A.'s disadvantage.

Suggested Economies

This is a justifiable generalization but it is also true that some cogent points were raised by Members on both sides. The Authority is bound by its Act to balance its accounts "taking one year with another" and unfortunately it is faced with ever-rising costs. Up to a limit ("what the traffic will bear") a balance can be achieved by raising prices, an undesirable policy which we hope and believe the Authority and Boards will eschew. It can also be done by trimming expenditure to the lowest level consistent with efficient operation. In the debate Members mentioned directions in which, they suggested, economies were possible.

Criticism of the boards of nationalized industries for increasing the number of "officials" is common form and the B.E.A. did not escape it in the debate. It is not easy to compare numbers before and after nationalization because in local authority undertakings some electricity supply work was done in other departments. As regards the "rank and file," however, the July *Ministry of Labour Gazette* shows that in mid-1948 140,200 men and women were employed in the electricity supply industry; in May this year the number had risen to 160,600. Part of the increase is due to the natural expansion of the service, but 14 per cent in two years is a rather big advance. There has been a spate of appointments in connection with entirely new ancillary activities. The Authority must beware of overdoing things in exercising the permissive powers conferred upon it by the 1947 Act.

Simpler Power Stations

Whether much reduction can be expected in the cost of power stations is doubtful when the preservation of "amenities" is so strongly urged. Mr. F. J. Erroll contended that 10 per cent could be trimmed off power station costs by simpler design. Here he seems to have been anticipated by the B.E.A. In its 1948-49 report the Royal Fine Art Commission says it "is pleased to note an increasing realization of the fact that, handled with imagination, a simple housing for the large-scale electrical equipment involved can be much more impressive than a cathedral-like structure."

One other matter among the many which were raised was the constitution and operation of the Electricity Consultative Councils. Two Labour Members advocated the entire independence of the Councils from the Electricity Boards. We agree that, having been formed, these Councils, ostensibly independent of the Electricity Boards, should be so in fact. But if they have to provide the whole of their own staffs and house them separately a great expense will be involved. We foresaw this at the outset and that is why we had no enthusiasm for the Councils. In our opinion much simpler and cheaper means of "protecting" the consumers could have been devised. This is a matter for the Minister to deal with. Both he and the B.E.A. will no doubt have taken full note of all useful criticisms and suggestions and, it is to be hoped, will take the necessary action.

GAS-TURBINE DEVELOPMENTS

Neither the diversity of research into, nor the amount of development of, gas-turbine technology in this country has hitherto been properly appreciated. Nearly two years ago it was pointed out on this page that very little of this work owes anything to ideas which originated abroad. Indeed, on the contrary, engineers overseas are now turning to home sources for information on this subject. The safeguarding of British makers against their having to seek manufacturing licences from foreign firms (referred to on another page) should avoid the payment of large fees out of the United Kingdom and, at the same time, ensure that British improvements are properly credited to their originators.

INTERFERENCE SUPPRESSION

One more step has been taken towards reducing the interference that some kinds of electrical equipment can cause with "radio-telegraphy"—more especially television and broadcast radio reception—by the appointment, reported on another page, of two committees to advise the Postmaster-General on the making of regulations to be complied with in the cases of engine ignition systems and refrigerators. Suppressor specifications already exist; also instruments for gauging the intensity of interference caused. How then can makers of offending appliances be induced to comply with the rules? The offer of incentives seems to be in fashion just now. In this particular case the stimulation of rivalry among users might be more profitable. It has been suggested that the fixing of a letter "S" to the windscreen of road vehicles which do not offend might urge other owners to follow the good example. The branding of household refrigerators with the E.D.A.-B.S.I. mark of approval should serve a similar purpose.

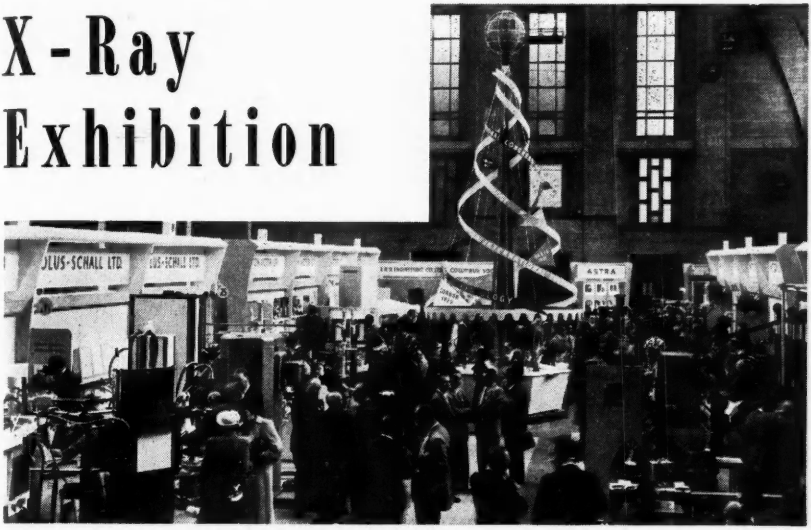
A 900,000 kW POWER STATION

The highest practicable thermal efficiency obtainable to-day by the use of the regenerative reheat steam cycle is claimed for Philip Sporn power station (U.S.A.). Particulars given on page 190 of four months' running seem to justify the expectation of the designers that a heat rate of 9,300 B.Th.U./kWh sent out can be maintained. The station has several novel features, which include recirculation of gas and dispensing with induced draught. Cyclone grit arrestors with chimneys 295ft high (145ft above the top of the buildings) are regarded as adequate to eliminate nuisance. Enviably situated regarding coal supplies, the station has the further asset of being on an inland waterway with a (presumably minimum) flow that will provide 40 million gal/hr of circulating water.

NATIONAL BOARDS

The agenda for the September meeting of the Trades Union Congress includes a number of resolutions dealing with nationalized industries, most of them aiming at greater trade union representation on the governing bodies. One union wants at least a third of the members of any board to be representative of the trade union movement, while another envisages control of these industries by the industries themselves by means of "industrial parliaments." Experience on the workers' side in an industry is a valuable qualification for membership of a board, but too great a trade union element would tend to make the board a body for negotiating wages and conditions. Other arrangements must be made for this purpose; the board's main object should be efficient service to the public. This can be assured only by men with a variety of experience and wider views.

X-Ray Exhibition



First Display for Thirteen Years

ALMOST every branch of X-ray engineering has advanced appreciably since the last assembly, in 1937, of the International Congress of Radiology, which met every three years, each time in a different country.

In conjunction with the sixth Congress, which met in several halls in Westminster last week under the presidency of Dr. Ralston Paterson, there was an exhibition (not open to the public) which filled both the old and new halls of the Royal Horticultural Society. Eighty makers and suppliers from Belgium, Canada, France, Germany, Great Britain, Holland, Italy, Sweden and the United States showed X-ray equipment for diagnosis and for treatment of varied types and in considerable quantities; together with a range of accessories and materials, as well as some electro-medical apparatus.

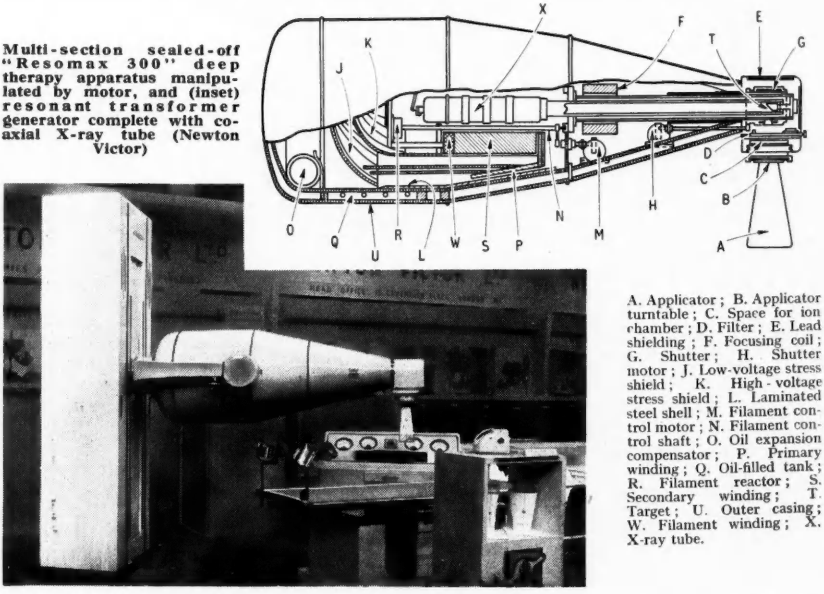
The cine-radiography outfit of Watson & Sons (Electro-Medical), Ltd., has been pioneered in collaboration with Dr. Russell J. Reynolds (1935-37), and used for some years at the Nuffield Institute for Medical Research at Oxford. One of the latest high-voltage models is being installed at the Ministry of Pensions' hospital at Roehampton. In addition to visual screening, moving X-ray pictures can be made of the joints, viscera and digestive processes for subsequent projection at normal and low speeds as an aid in diagnosis and teaching.

The four-valve 120 kVp transformer is so controlled by an electronic contactor that the "Super Dynamax" rotating-anode Machlett tube is energized only while the shutter of the cine-camera is open, to reduce the time of exposure of the patient to the rays. The image is formed continuously on a fluorescent screen which is filmed through a wide-angle lens with a 35 mm camera, which can be loaded and unloaded with film in daylight. The photographing speed can be adjusted from 3 to 50 frames/sec in sub-multiples of 50, the driving motor being synchronized with the a.c. input frequency. The patient can be rotated on a seat while the film is being taken; both camera and film can be moved at will for "scanning." Other Watson products included a specialized dental outfit for full-mouth examination without moving the patient or the base of the apparatus.

Examples of work done by the G.E.C. Research Laboratories for Watsons included a 30 MeV synchrotron vacuum annulus, an accelerator tube for a van de Graaff generator, and a selection of Geiger-Müller tubes. An entirely new illuminator for X-ray film which incorporates a specially designed cold cathode tube in the form of a grid, provides three degrees of intensity, starts instantaneously, has a cold "Perspex" front, improved type of film holder and a plastic drip tray.

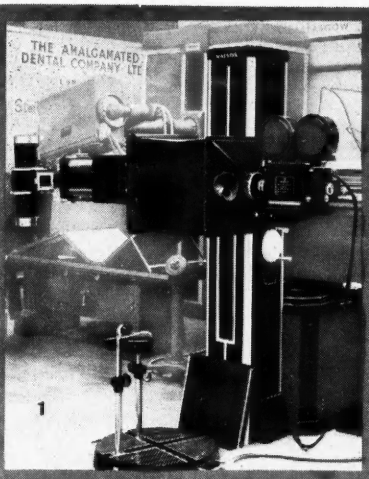
What is described as the first high-voltage apparatus of its kind for cancer treatment to be designed and wholly manufactured on a production basis in Britain and unique in its incorporation of the first British-built, multi-section, sealed-off X-ray tube is the "Resomax 300" unit. This deep therapy apparatus is a joint product of Newton Victor, Ltd., and the Metropolitan-Vickers Electrical Co., Ltd. It embodies advanced operating and control features and is rated for continuous operation at 300 kVp and 20 mA. Its X-radiation output of 80 r/min free-in-air at 50 cm with a half-value layer of 2 mm of copper, strikingly exceeds the specifications of both the Ministry of Health and the Faculty of Radiologists for equipment of this type.

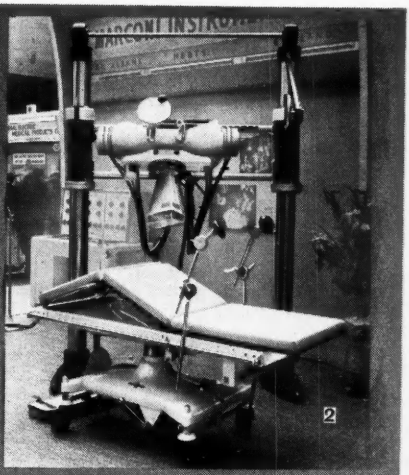
A resonant transformer for 1,000 c/s input generates the high voltage; elimination of the iron core and the co-axial mounting of the X-ray tube within the transformer save weight and space. The first portion of a series of pancake coils is the primary winding, followed by a further stack to form the secondary, with a final coil to supply the filament of the X-ray tube. Tappings are connected to the intermediate accelerating electrodes of the multi-stage sealed-off X-ray tube to ensure a uniform voltage gradient over the whole length of the tube, the tungsten tube-target being at the extremity of a metal tube projecting 30in from the tank containing the oil-immersed transformer. Being at earth potential the target can be cooled by mains water or by simple circulating pump without problems of electrical insulation arising. The pillar support is equipped with motors under push-button control for raising, lowering and angulating the source of radiation. The desk-type con-



Multi-section sealed-off "Resomax 300" deep therapy apparatus manipulated by motor, and (inset) resonant transformer generator complete with co-axial X-ray tube (Newton Victor)

A. Applicator; B. Applicator turntable; C. Space for ion chamber; D. Filter; E. Lead shielding; F. Focusing coil; G. Shutter; H. Shutter motor; J. Low-voltage stress shield; K. High-voltage stress shield; L. Laminated steel shell; M. Filament control motor; N. Filament control shaft; O. Oil expansion compensator; P. Primary winding; Q. Oil-filled tank; R. Filament reactor; S. Secondary winding; T. Target; U. Outer casing; W. Filament winding; X. X-ray tube.





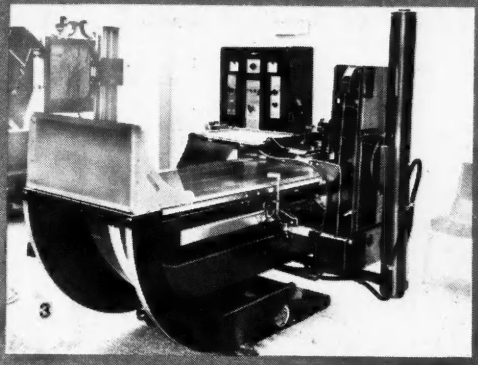
1. Cine-radiography outfit with rotating-anode tube at left, camera at right and turntable for the patient in the foreground (Watson & Sons)

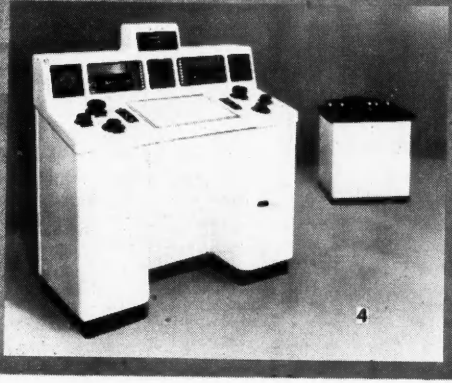
2. Gantry tube stand and table for deep therapy (Marconi Instruments)

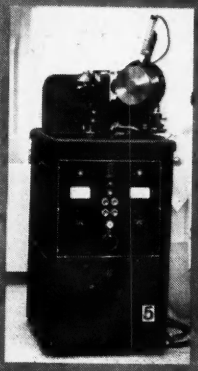
3. Single-tube motor-driven table (Marconi)

4. Control desk and generator of 1,000 mA at up to 125 kVp (Philips)

5. Water-cooled X-ray diffraction cabinet for industrial uses (Philips)







trol unit is normally placed outside the treatment room. Voltage is controlled by a small rheostat which adjusts the excitation of the high-frequency input alternator.

The expansion three years ago of the electro-medical appliance range of Marconi Instruments, Ltd., to include X-ray equipment involved extension of the factory and the provision of heavier machine tools. To the initial 500 mA diagnostic unit other types have been added. The 250 kV deep-therapy model has a massive gantry tube stand which can be installed without structural alterations or reinforcement. Mechanical and electrical locking is provided; the tube-head shutter is actuated from the distant control panel and an acknowledgement system prevents initiation of exposure without the correct filter in position, while shutter position is indicated by pilot lamps and warning bell.

There is an electronic current stabilizer; voltage is directly indicated on the step switch (2 kV increments) of the auto-transformer illuminated dials; the exposure timer can be pre-set to within 0.01 min between 0 and 60 min, while the number and total duration of exposures are recorded. The generator consists of transformers, four valves and four condensers in a voltage-doubling circuit.

A versatile motor-driven table can be tilted by foot switch at any angle up to the vertical. A multi-directional arm enables the single rotating-anode tube to be moved above and below. The tube and fluoroscopic screen are coupled to move in unison and the screen folds back against the supporting tower.

The varied display of Philips Electrical, Ltd., included the "Super DLX" four-valve control desk and generator of 1,000 mA at up to 125 kVp, fully automatic or otherwise, providing for the operation of up to eight foci and for the connection of eight items of auxiliary equipment, including angio-cardiography. A mass chest radiography outfit with four-valve generator of 200 mA at 100 kVp, which is transportable, is constructed in the form of easily assembled units, having a "Rotalix" tube and mirror camera.

Dental equipment included the "Oralix," claimed to be the smallest X-ray unit in the world, which can be attached to a chair or mobile pedestal, or suspended from the ceiling. There were electro-cardiographs, electro-treatment apparatus, many accessories and a high-intensity X-ray diffraction outfit, shock-proof and water-cooled, with a full-wave generator furnishing 50 mA at up to 60 kV, specially designed for research and control purposes in industry.

Selected types of X-ray tubes, oil-immersed and water-cooled; high-voltage rectifiers and Geiger-Müller counter tubes were shown by Mullard Electronic Products, Ltd.

Stationary and mobile "Sterling" models of the Amalgamated Dental Co., Ltd., with 10 mA at 63.6 kVp rating, are designed to operate with d.c. or a.c. (40-100 c/s) at all standard input voltages.

A portable X-ray unit, "Protexray" tubes and accessories, were displayed by Cuthbert Andrews and electrometers, ionization meters and radiation detectors by the Baldwin Instrument Co., Ltd.

A range of electronic therapeutic and diagnostic apparatus is made by Stanley Cox, Ltd., and a variety of physical medicine equipment by the Cox-Cavendish Electrical Co., Ltd. Diagnostic as well as superficial medium therapy X-ray outfits are offered by A. E. Dean & Co., electro-encephalographs and accessories by the Edison Swan Electric Co., Ltd., short-wave and other treatment devices by Electro-Medical Supplies (Greenham), Ltd., and artificial gamma-active materials and accessories for industrial radiography by the E.R.D. Engineering Co., Ltd.

A wide range of X-ray apparatus is obtainable from General Radiological, Ltd., and medical treatment lamps from Hanovia, Ltd. The manufacturing plant set up in England by Machlett X-ray Tubes, Ltd., is now producing a variety of tubes based on American patterns. Medical treatment instruments, dental X-ray units and the "Shipweld" industrial radiology outfit are made by Solus-Schall, Ltd. A range of Geiger and beta counter tubes is available from 20th Century Electronics, radiation dose meters from Cinema-Television, Ltd., and monitors and electroscopes from Fleming Radio (Developments), Ltd.

The Ministry of Supply (radio-chemical centre) prepares natural and artificial radio-isotopes for use in research and therapy.

VIEWS on the NEWS

By REFLECTOR

THE question "What is Electricity?" is a classic one, but we are better placed to convey some idea of its nature now than we were when the question was first posed. At all events I consider that a good attempt to answer it is made in the E.D.A. film which has the question as its title. It is designed for presentation to schoolboys and schoolgirls, and is accompanied by some lucid (though sometimes non-committal) notes by Mr. J. A. Stedman, who enjoyed the advice of Dr. P. Dunsheath in preparing them. Readers who have not seen the film yet and have the necessary time on Thursday next will be able to see it on their television sets.

* * *

Another E.D.A. film—"More Power," in which Lord Citrine reports progress in generating station construction — was recently reviewed by the *Kinematograph Weekly*. In the course of the review it was asked: "As the public are shareholders, why has no arrangement been made for the film to be shown throughout the country to commercial kinema audiences?" As the journal presumably speaks for the kinema (the uncommon "k" is forced on me) industry, I suppose this means that the trade considers the film suitable for public showing. I remember that about three years ago a "short" on the same subject produced by the Crown Film Unit for the Minister of Fuel was shown at about 3,000 theatres. My recollection is that it was not half as good a production as "More Power."

★ ★ ★

I notice that in the House of Commons debate on electricity supply last week Mr. Noel-Baker said that the British Electricity Authority had a programme for the next five years of 47 new power stations and 35 extensions of existing plants. At the same time the B.E.A. advertisements were announcing the building of only 38 new stations and 43 extensions. There seems to be some confusion here. The two totals are almost the same; is it that new stations on the sites of present ones are sometimes called extensions? Anyhow, the Minister and theAuthority should tell the same tale.

★ ★ ★

Whatever the rights and wrongs of the B.E.A.'s Welsh water-power proposals may be, it is going a little far to say: "Mere æsthetics alone are not involved. The deepest moral, social and spiritual issues are at stake and the struggle is, in fact, a struggle for very existence." These are the views of a clerical gentleman expressed in a letter to the *Western Mail*. He rises to a peroration which paraphrases Pitt: "But if this scheme is stopped Wales may have saved herself by her exertions and the world by her example."

★ ★ ★

Dry summers, as well as cold winters, lead to curtailment of electricity consumption in France. The official bulletin of the A.P.E.L. (Société pour le Developpement des Applications de l'Electricité), the French equivalent of E.D.A., hopes, however, that the position will be easier this year and that the "sévères restrictions administratives" will be reduced or avoided. The improvement is attributed to "le magnifique effort d'équipement poursuivi par Electricité de France" (the French counterpart of the B.E.A.). Here, we hope that the equally magnificent efforts of the B.E.A. will also result soon in less load shedding.

★ ★ ★

I am told that at a recent sports gathering and gala arranged by the staff of Bull Motors the ages of the winning competitors ranged from three months to 53 years. The latter was the winner of a veterans' race; the youngest was, appropriately, the daughter of a member of the fractional h.p. staff who was adjudged the best in a baby contest.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IN consequence of the transfer of **Mr. A. H. Hughes** (British Insulated Callender's Cables, Ltd.) to Leeds, **Mr. T. C. F. Bigland** Straight-Lite Reflectors, Ltd.) has been appointed acting hon. secretary of the Batti-Wallahs' Society.

Mr. W. L. Barrows has joined the board of the Revo Electric Co., Ltd., and has been appointed chairman. **Mr. G. H. Gunson** has been appointed a deputy chairman.

Mr. H. S. Holbrook, B.Sc., M.I.E.E., Fel. A.I.E.E., relinquished the managership of the Transformer Engineering Department of the British Thomson-Houston Co., Ltd., on 1st August on being appointed consulting engineer on transformers. As an acknowledged authority on transformers, he will now be able to devote his time more fully to work on committees and panels, not only within the transformer industry, but

Mr. H. S. Holbrook

Mr. K. W. McBain

nationally and internationally. **Mr. K. W. McBain,** M.I.Mech.E., M.I.E.E., Mem. A.I.E.E., who has been on the staff of the B.T.H. Transformer Engineering Department for many years, latterly as chief assistant to Mr. Holbrook, has been appointed manager of the Department.

Mr. Holbrook joined the company in 1910 and has been engaged on the design of transformers since 1911. He was appointed chief transformer engineer in 1929, in which year he presented a paper to the C.I.G.R.E. in Paris, and since that date he has been actively associated with the development of many new transformer constructions. He has visited Canada, the U.S.A. and many European countries, and has devoted much time to service on B.S.I., E.R.A., B.E.A.M.A. and other committees. In June last year he presented a paper at the first British Electrical Power Convention on "Power Transformers for Systems Operating at 200 kV and Above."

Mr. McBain's early engineering activities were mainly in connection with steam engines, as he served his apprenticeship in marine engineering. He joined the B.T.H. Transformer Drawing Office in 1924 and shortly afterwards was transferred to the Transformer Engineering Department where for a considerable time he has been in charge of the large high-voltage transformer, rectifier transformer, and miniature transformer sections, being responsible for both the electrical and mechanical design. Mr. McBain has always been interested in the welfare and training of young engineers and during the years 1926 to 1939 was on the part-time staff of the Rugby College of Technology and Arts as a lecturer in the higher mathematics and engineering subjects of the final degree and Higher National Certificate courses.

Mr. E. C. Holroyde has consented to continue as president of the Electrical Industries Benevolent Association for a further year.

On 20th July the chairman and directors of Bullers, Ltd., gave a dinner at the Criterion Restaurant, London, to mark the retirement of **Mr. A. J. Newman** after completion of forty-eight years' service with the company.

We are sorry to hear that **Mr. James Gray,** the Brush Electrical Engineering Co.'s manager for Scotland, is at present in Glasgow Infirmary Annexe where he has undergone a major operation. During his absence **Mr. E. Cooper,** who was general manager at the company's Leeds works, will act as temporary manager for Scotland.

The inauguration of a long-service benefit scheme for staff and hourly paid employees took place in the canteen at the Dagenham works of **Southern United Telephone Cables, Ltd.,** on 25th July. In his opening speech, Mr. W. F. Bishop, C.B.E., chairman, reviewed the progress of the company since its inception and that of its predecessor, the Union Cable Co., in 1912. Mr. Bishop presented National Savings Cer-

tificates to the value of £20 to each of 78 employees with 20 years' service and over with the Southern Co. and its associates. The general manager, Mr. A. F. Lampitt, said that Mr. Bishop (who had completed 55½ years in the telephone cable industry) had agreed to accept the first long-service certificate. Mr. Wopling (46 years' service) thanked Mr. Bishop and the Board, and he was supported by Mr. George Taylor (37 years' service).

Mr. Frank Foulkes, president of the Electrical Trades Union, and **Mr. W. C. Stevens,** the secretary, were to leave for a visit to the Soviet Union on Monday with five other members of the E.T.U.

Miss Vera Norvick, who is assistant secretary of the Electrical Association for Women, has been appointed chairman of the Women's Committee of the Housing Centre.

Thorn Electrical Industries, Ltd., have appointed **Mr. L. Ruda** as sales manager (home and overseas) of their Mary Ann Domestic Appliance Division. Mr. Ruda has recently returned from a very successful trip to New Zealand, Australia, Malaya, Burma, Siam, India and Pakistan.

Mr. F. C. Jarvis has resigned his directorship of the Queensbury Engineering Co., Ltd., and has joined the Atlas Lighting Division of Thorn Electrical Industries, Ltd. Mr. Jarvis was for five years with Smart & Brown as contract manager.

Mr. H. Finch has been appointed by J. H. Tucker & Co., Ltd., to cover their sales interests in North-West England. His telephone number is Formby 943.

Mr. C. R. Lock has been appointed as representative of Ekco-Ensign Electric, Ltd., for certain parts of Hampshire, Dorset, and South Wiltshire. He will be based at the company's London office at 5, Vigo Street, W.1.

Mr. W. A. May, export manager of Berry's Electric, Ltd., has sailed for America to supervise the erection and management of the company's stand at the United States International Trade Fair in Chicago.

Mr. L. W. George, executive officer, Aldershot District, Southern Electricity Board, has retired and was recently entertained by his colleagues at luncheon where a presentation was made to him. Mr. George was borough electrical engineer of Aldershot from 1937 until vesting day, having been deputy there since 1921. Before going to Aldershot he had served with the Llandrindod Wells E. L. & P. Co., at West Ham and Horsham. For five years he was chairman and secretary of the London and Southern Section of the

Mr. L. W. George with his colleagues

At the back: Messrs. R. J. Harley (manager, Basingstoke District) and H. E. Taunt (Chichester District). Middle row: Messrs. G. R. M. Brown (secretary, Portsmouth Sub-Area), H. R. Farries (Aldershot District), E. Jordan (Isle of Wight District), and J. M. Marshall (accountant, Portsmouth Sub-Area). Front row: Messrs. H. Robson (Portsmouth District), L. W. George and E. A. Logan (manager, Portsmouth Sub-Area).

Committee of Small Municipal Electricity Undertakings and he has actively served the Associated Municipal Electrical Engineers. He was also the first president of the Aldershot Social Club.

Messrs. M. E. Rustin, E. R. Norbury and **A. G. Jackson** have been appointed additional directors of Ward & Goldstone, Ltd.

On 22nd July about 3,000 **Exide** workers and their relatives went on one of the largest works' picnics to be held in the North since the war. The party was entertained to lunch by the directors of the company at the Winter Gardens.

About seventy apprentices from factories of **Joseph Lucas, Ltd.,** in Birmingham, London, Burnley and South Wales are now in camp at Highcliffe-on-Sea, Hants. They return on August Bank Holiday.

The East Sussex and South West Kent Sub-Area of the **South Eastern Electricity Board** held its first annual sports day at Hawkhurst, Kent, on 15th July, when more than 1,000 employees and friends attended. Sports and social clubs in the Sub-Area taking part included those from Eastbourne, East Grinstead, Bexhill, Hastings, Tonbridge, Tunbridge Wells and the Weald District. A large marquee was erected on the ground in which was staged a very comprehensive arts and crafts exhibition. Nearly 300 exhibits were submitted and prizes were awarded for the best three in each of the 30 classes. Many senior officers of the Board were present, including the chairman (Mr. Norman Elliott), deputy chairman (Mr. W. R. T. Skinner), secretary (Mr. A. L. Burnell) and Mr. N. Boydell (Sub-Area manager). The chairman of the

Sports Day Committee was Mr. W. R. Abram (Weald District manager) and the general secretary of the Committee was Mr. A. W. White (Sub-Area headquarters).

Twenty-five employees of the **Liverpool Electric Cable Co., Ltd.,** were the guests of the directors recently when Mr. W. J. Terry (managing director) presented each with a long-service badge and National Savings tokens. Mr. J. Catherwood, foreman, voiced the appreciation of the employees. At the ceremony Mr. J. T. Frost, works manager, presented to Mr. Terry a long-service badge marking his twenty-seven years with the company. Also present were Mr. G. E. Jewell (director) and Mr. F. W. Freeman (director of an associate company).

OBITUARY

Mr. John Frederick Avila, A.M.I.E.E., A.M.I.Mech.E., whose death occurred recently at the age of seventy, was an original member of the Batti-Wallahs' Society, formed in 1906. From that year until 1911 he served as secretary, and in 1914 he held the office of president. Educated at Brighton Technical College, he joined Simplex Conduits in 1898 and except for a break of two years (1900-1902) as a seagoing electrician with the P. & O. Steam Navigation Co., remained with the company until 1924, holding the positions of London sales manager, works manager, and London branch superintendent. In 1925 he was appointed London sales superintendent with Callender's Cable & Construction Co., Ltd., and the following year became a partner in John Stirling & Co. His later associations were with Girdlestone & Co., the Union Cable Co., and the Liverpool Electric Cable Co., and from 1936 to 1940 he was technical sales representative with the Telegraph Construction & Maintenance Co. He had been living in retirement of Buckhurst Hill, Essex.

Mr. F. C. Guildford.—The death occurred suddenly on 27th July of Mr. Frederick Charles Guildford, chairman of the Sloan Electrical Co., Ltd. Mr. Guildford was taken ill while returning from a holiday cruise and died on board ship. He was fifty-seven. The funeral took place on Wednesday at Golders Green Crematorium.

Mr. Frederick Fuller Turner, of Jesmond, Newcastle-on-Tyne, who has died in hospital, was until his retirement earlier this year manager for 25 years of the Newcastle branch of Philips Electrical, Ltd.

Radio Interference

Advisory Committees Appointed

THE president of the Institution of Electrical Engineers, with the approval of the Council, has nominated 45 persons to constitute the panel provided for by Section 9, Subsection (2) of the Wireless Telegraphy Act, 1949. From this panel, the Postmaster-General has appointed an advisory committee of 17 members which he will consult before making regulations for prescribing the requirements to be complied with in the case of the ignition systems of certain internal combustion engines to ensure that they do not cause undue interference with radio telegraphy, and another advisory committee of 18 members which he will consult before prescribing requirements to be complied with in the case of refrigeration apparatus.

The members of the first committee (Ignition Systems) are:—Col. Sir A. Stanley Angwin K.B.E. (chairman); Mr. A. H. Ball, A.M.I.E.E.; Mr. H. Bishop, C.B.E., B.Sc.(Eng.) M.I.E.E.; Mr. S. R. Burbidge; Sir John Dalton, A.M.I.E.E.; Mr. W. J. Edwards, B.Sc.; Sir Peirson Frank, M.Inst.C.E.; Mr. P. Gratwick, A.C.I.S.; Professor Willis Jackson, D.Sc., D.Phil., M.I.E.E.; Mr. E. M. Lee, B.Sc., M.I.E.E.; Dr. H. E. Merritt, M.B.E., D.Sc.(Eng.), M.I.Mech.E.; Mr. E. L. E. Pawley, M.Sc.(Eng.), M.I.E.E.; Mr. N. E. Rowe, C.B.E., B.Sc., F.R.Ae.S.; Mr. G. F. Sinclair, C.B.E., M.I.E.E.; Mr. T. M. H. Stubbs; Mrs. C. Renton Taylor and Dr. S. Whitehead, Ph.D., M.A., M.I.E.E.

The members of the second committee (Refrigeration Apparatus) are:—Dr. F. T. Chapman, C.B.E., D.Sc.(Eng.), M.I.E.E. (chairman); Mr. E. G. Batt; Mr. A. H. Bennett, M.I.E.E.; Mr. J. I. Bernard, B.Sc.Tech., M.I.E.E.; Mr. J. S. Boyd; Mr. A. H. Cooper, B.Sc.; Mrs. M. Courtney, J.P.; Mr. W. J. Edwards, B.Sc.; Mr. J. Flood, Associate I.E.E.; Mr. F. Gratwick, A.C.I.S.; Dame Caroline Haslett; Mr. T. H. Kinman, M.B.E., M.I.E.E.; Mr. D. A. Maurice, A.M.I.E.E.; Mr. G. F. Peirson, M.I.E.E.; Mrs. C. Renton Taylor; Mr. C. J. Veness; Mr. C. O. Watson, M.I.E.E., and Capt. F. J. Wylie, R.N. (Retd.).

The names of the other person on the panel, on whose services the Postmaster-General will be able to call when regulations in respect of other types of apparatus are to be framed, are:—Dr. T. E. Allibone, D.Sc., Ph.D., M.I.E.E.; Dr. P. Bauwens, M.R.C.S., L.R.C.P.; Mr. J. R. Beard, C.B.E., M.Sc., M.Inst.C.E., M.I.E.E.; Mr C. M. Cock, A.M.I.Mech.E., M.I.E.E.; Mr. R. L. H. Ewin; Dr. J. S. Forrest, M.A., D.Sc., M.I.E.E.; Capt. C. Higgins, O.B.E., B.Sc.(Eng.), M.I.E.E.; Mr. M. O'C. Horgan, M.I.E.E.; Mr. W. J. Jones, M.Sc.(Eng.), M.I.E.E.; Mr. C. W. Marshall, B.Sc., M.I.E.E.; Mr. C. Riley, B.Sc.Tech., A.M.I.E.E.; Mr. C. N. Rocky and Mr. W. Thomson, B.Sc., A.M.I.E.E.

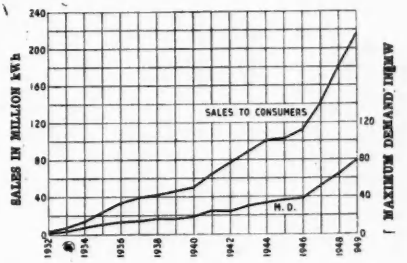
NORTHERN IRELAND SUPPLY

Financing Rural Electrification

THE Electricity (Supply) Act (Northern Ireland), 1948, directed particular attention to rural electrification. To encourage this the Act provided for the discontinuance of minimum accounts and of the charging for service lines in excess of the usual free length of 60ft in respect of rural supplies for agricultural and non-industrial purposes. In the 1949 report of the Electricity Board, as might be expected, it is stated that since the passing of the Act requests for supplies from farmers and other rural residents have continually increased. The Board is pressing forward with the Government's electrification policy to the fullest extent of materials available, but it is clear that even under the best conditions the revenue will not meet the cost of giving the supplies.

On this point an understanding was reached with the Government last December to the effect that the Board should proceed on the basis of its estimate of an expenditure of £900,000 in the two years to the end of 1951, at which time the Ministry of Commerce, together with the Board, will examine the position to see whether an approach should be made to Parliament, as provided for in the Act. It is estimated that the expenditure of £900,000 will enable a further 3,750 dwellings to be connected.

The continued upward trend in costs generally is a matter of concern, and Sir William Robinson, chairman of the Board, forecasts an increase in tariffs if this rise is not halted. Coal clauses are already embodied in all consumers' accounts and these charges now amount to a substantial proportion of each account.

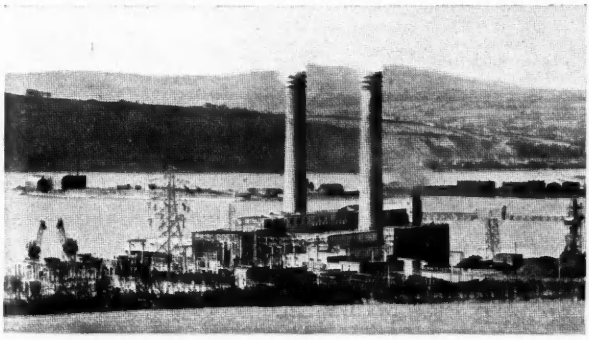


kWh sold per annum and maximum demand

With regard to the results for the past year, the Board's report, signed by the secretary, Mr. Lendrick McMaster, shows that the number of consumers increased by 9,520 to 92,586 and sales expanded by 20.9 per cent to 217.5 million kWh. Revenue, at £1,449,587, was up by £225,087, but the average price received per kWh sold decreased from 1.56d to 1.54d. The net result was a surplus of £660, to which is added a credit balance of £37,688 brought forward. Consent was received during the year to the borrowing of further sums amounting to £4,850,000, making a total of £10,950,000 sanctioned.

At the beginning of 1949 the Ballylumford and Larne generating stations were transferred from the Ministry of Commerce to the Board. At Ballylumford the fourth 30,000 kW turbo-alternator together with a 1,500 kW house set is expected to be ready by the end of this year or the spring of next, making the total capacity of the station 124,500 kW.

Approximately 160 miles of h.v. lines were constructed during the year and 124 miles of l.v. mains and distributors were added, the totals at 31st December being 1,791 and 1,111 miles, respectively.



Ballylumford power station, transferred to the Board from the beginning of last year

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Quarry Cables

IN reply to D. E. Smith, of Formby, Lancs, I do not agree that the tape armoured cable for mine and quarry work does not comply with the required conductance. I have several runs that do give more than the 50 per cent without a paralleled earth run as he suggests.

Experience has shown, however, that the tape armour, very often on the surface in a gravel pit, rusts and also that the joint end boxes must be constantly overhauled to make sure the clamping of the tape is good, not an easy job on d.s.t. armoured cable.

Regarding steel wire armoured cable, surely the galvanized wire is of primary importance; it is comparatively easy to clean and the resulting earthing at the joint end box is electrically and mechanically sound, and will last for years unattended.

Egham, Surrey. J. MILLER, J. Miller & Son.

FOR Mr. V. G. Button's information there would appear to be two main reasons why the use of p.i.l.c. steel type armoured cable is not approved in the Quarries General Regulations, 1938, No. 1233.

In the first place, Regulation 9 (1) stipulates that the "metallic covering" of a cable shall have a conductance of not less than half that of the same length of the largest of the live conductors enclosed therein, and that the conductance of the lead sheath may be included as contributory, provided that plumbed joints be used where the cable is jointed or terminated. If the definition of wire as given in the Oxford Dictionary "metal drawn into the form of thread, cord, or tape" be accepted, the Quarries Regulations should permit the use of tape, but it is doubtful whether all sizes of s.t.a. cable comply with this condition, whereas all double wire armoured cables do so.

Secondly, from the point of view of mechanical strength, double wire armouring is preferable, particularly on the quarry floor itself, adjacent to the face, where in many cases the cable is laid on the surface of the ground. The cable is moved, as required by machine operations, using cable coupling boxes which divide the run into definite lengths for supplying the gate-end switches controlling excavators. If d.w.a. cable be used in these cases, "bird-caging" is prevented and over-bending of the cable checked, thus reducing the possibility of damaging the lead sheath of the cable.

Kenfig, Glam.

C. J. BEAVIS,
British Industrial Solvents, Ltd.

Incentive Schemes

THE letter in your issue of 28th July from Mr. W. J. Mann on the subject of incentive schemes is one which should not go unanswered. It is clear that Mr. Mann is somewhat confused in his terminology, and seems to regard incentive schemes, payment by results and piece-work as one and the same thing. This is not so, unless Mr. Mann regards the dividends he gets on his shares in his company as piece-work; in my view, such a dividend is an incentive.

As I pointed out in my article, an incentive scheme has been operating successfully in Sweden for thirty years, and should it be that Mr. Mann has not been to that country, I suggest that he goes to see for himself the high standard of work which is maintained. His argument ignores the function of management. Whether an incentive scheme operates or not, bad work will be done by bad workmen unless supervisors and foremen, managers and managing directors all do their job.

The nigger in the wood pile, so far as Mr. Mann's contribution is concerned, is contained in the last sentence. He advocates that we should devote ourselves as

a section of the industry " to the training of apprentices to follow the skilled man of to-day." I would remind him that it is the skilled men of to-day who, for one reason or another, are producing 30 per cent less output than was the custom before the war, and it is just that sheep-like following-on which needs to be varied if progress is to be made in the industry.

The function of management is to manage, to have courage and imagination, and the confidence to progress, and Heaven help us if we leave it at the stage of training apprentices in the present-day productivity tradition.

Perhaps Mr. Mann would explain his proposals for obtaining the 50 per cent increase in production which is needed if we are merely to maintain our pre-war standards, let alone improve them.

*London, E.C.*4.

J. MORTIMER HAWKINS,
Managing Director,
Mortimer, Gall & Co., Ltd.

GREAT YORKSHIRE SHOW

Establishment of a Temporary Power Station

THE annual show of the Yorkshire Agricultural Society is one of the country's leading events of that nature. This year it enjoyed a conspicuous success when held at Malton, which town is in the centre of an agricultural area half way between York and Scarborough, and it attracted leading exhibitors whose wares are of interest to the farming community.

From an electrical engineering point of view this year's show was of more than usual interest. Owing to the position of the showyard relative to existing power distribution mains, the Society decided to have an independent source of supply. A generating station was accordingly laid down to contain eight diesel-electric a.c. sets, each of 55 kW capacity. Facilities were provided for parallel operation, so that control could be suited to variations in load conditions. The total connected was 530 kW, of which 240 kW was for catering purposes, electrical energy being exclusively employed for this purpose.

The Brush alternators, 400/440 V three-phase (230/250 V single-phase) 50 c/s, were driven by McLaren vertical, four-cylinder, four-stroke cycle, totally enclosed, compression ignition, cold-starting oil engines, 142 mm bore by 200 mm stroke, each developing 88 b.h.p. at a speed of 1,000 r.p.m. The whole was mounted on a single base bedplate, complete with Brush switchboard equipped with a triple pole and neutral totally enclosed fuse-switch with high rupturing capacity tag type cartridge fuses; three 15 VA current transformers of class "C" accuracy; 0/150 A meter with selector switch; voltmeter with fuses; automatic voltage regulator (carbon pile type) with suitable hand/auto change-over switch and one hand field regulator.

The eight sets stood on anti-vibration mountings installed direct on to steel plates

Diesel-electric power house at the Yorkshire Agricultural Society's Show at Malton

placed on the turf, requiring no foundations whatsoever. They were wired in parallel on to a common busbar, thence to a switchboard for distribution through three feeders.

Energy was afforded in advance to enable the caterers to provide meals for stockmen and the tradesmen engaged in erecting exhibits. A popular feature, too, was the washing facilities provided for stockmen, electric immersion heaters being installed for water heating.

The sets went into operation on Sunday, 2nd July, but consumption was not metered until the day before the actual opening, Monday, 10th July, when 3,472 kWh was consumed. During the actual three-day period of the show, 11th, 12th and 13th July, 11,593 kWh was consumed, making a total of 15,065 kWh for the four days.

These sets are designed for a fuel consumption of 0.62 lb/kWh at full load. Some 1,500 gallons of Shell gas oil was supplied by the courtesy of Shell-Mex and B.P., Ltd., who also supplied the "Rotella 30" lubricating oil, but owing to the short period during which the sets were operating, the consumption was negligible.

Of the 11,593 kWh consumed during the actual three days when the show was open, 6,450 kWh was consumed on the exhibitors' stalls, 3,364 by the catering establishments and 1,776 in the stockmen's canteen and cubicles.

Although the sets are designed for a total capacity of 440 kW the peak load was 480 kW, but this did not in any way cause embarrassment as these sets are designed to take an overload of this order.

Self-contained Supply

This innovation of self-contained supply, if adopted generally, will enable exhibitions to be held in areas which could not formerly be entertained, due to the remoteness from main sources of electric power. By utilizing varying numbers and sizes of self-contained generating sets, any demand can be satisfied. These sets were developed to meet power cuts during 1947 and as this necessitated their being extremely transportable, to enable them to be swung into operation at short notice, often under adverse conditions, both as regards suitability of site and coverage, they were admirable for this particular method of operation.

The overhead distribution network, which was designed and erected by Dale Electric (Yorkshire), Ltd., of Filey, extended to approximately two miles of four-wire mains, at standard voltage and frequency. This firm was also responsible for making connections to stands and for the complete operation of the supply system. Despite its self-contained nature, no limitation was placed on any exhibitor, nor were the caterers limited to any particular demand.

The showyard occupied a site which is on the edge of a limestone ridge. In consideration of the poor soil cover and its consequential high resistivity it was decided to adopt multiple earthing for the neutral of the system. The effect was to provide a connection to the general earth mass of sufficiently low resistance to afford protection within the limits of the switchgear fuse ratings.

J. & H. McLaren, Ltd., of Leeds, installed the sets on the site; their engineers operated on a shift basis to drive the plant continuously from the 3rd to 14th July.

Industrial Injury Claim

A CLAIM by a member of the Association of Supervising Electrical Engineers for benefit under the National Insurance (Industrial Industries) Act, 1946, was recently rejected by a National Insurance officer. The circumstances were that the applicant, a test and survey engineer, who would normally have gone from his home at Greenwich to a job at Bournemouth, had been instructed by his employers to call first at their Hendon office. Upon boarding a train at Greenwich station he slipped between the train and the platform and was severely injured. The insurance officer held that his injuries did not occur in the course of his employment.

The A.S.E.E. appealed on its member's behalf to a Local Appeal Tribunal and secured a majority verdict in his favour, and this decision was later confirmed by the Commissioner, who held that while on ordinary office days the claimant did not begin his work until he set foot in his office, on those days on which he was directed to proceed to some place outside London, and to do so from his home without first reporting at the office, clearly the course of his employment commenced at the moment he got off his own doorstep. The Commissioner said he could see no difference when his call at the Hendon office was necessitated by his inability to receive his instructions the day before, so that he was ordered to go to Bournemouth by way of Hendon. Had the claimant been told to go to Bournemouth but on the way there to wait at a certain place to receive instructions, and, whilst waiting as directed, met with an accident, it could not rightly be said that there had been an interruption of the employment at the time of the accident so as to deprive him of the protection of the Act.

ELECTRICAL CONTRACTING:
Organization and Routine

By H. R. TAUNTON, A.M.I.E.E.

10—*Estimating (continued)*

UNLESS a specification is very vague, there is rarely scope for any serious discrepancy in measuring up and pricing the material for it. It is the difference in estimators' ideas of the time required for its various labour items which decides the differences in the totals of competing tenders, assuming equal care, accuracy, and skill in the estimators, and equal conditions and facilities for buying. Yet no two will arrive at the same *net* cost for the same job, simply because no two will be found to agree in their estimates of the labour involved in even the commonest operations.

Data from Experience

Certain figures are available in print but, after all, they only represent the opinions of other estimators, and at the best can only apply to normal cases. In the end, therefore, each must rely on his own resources and the accumulated data of his own experience, when he comes to pricing labour. It is then that, for the first time, he begins literally to estimate.

From one point of view, his work is now guesswork. He has to "guess" how long it will take men of average skill, working under known or assumed conditions, to complete a certain operation. He has to guess as accurately as he can, but still to guess; and all that saves his guess from being a mere gamble is his knowledge of what a similar operation has cost in the past. He will know that for that particular operation a certain upper limit would be as absurd as a certain lower limit would be impossible.

Nothing is more valuable, nothing more essential as a check on the fallible impressions of experience, than the records of the cost ledger. Lacking full and accurate costs of all work, however small, carried out by the firm, estimates can have no pretension to accuracy. If, however, the estimator is able to extract from the cost ledgers data sufficient for the compilation of certain basic figures on which to exercise his judgment, he will have the advantage of estimating on either side of a fixed point, instead of between two points more or less widely apart. The nearer approach to accuracy thus obtainable is well worth the trouble of preparing and occasionally revising a series of labour averages—of "man-hour" constants—for the commoner operations of electrical contracting.

Without some such basis the estimator has to make a fresh mental estimate for every labour item for every job, with results that may vary widely with his mood. Anxiety to secure a certain order may one day make him as unduly rash as, on another, a dyspeptic luncheon may make him over-pessimistic of his workmen's capabilities. If he can rely on prepared constants, however, his results are comparatively stabilized.

Labour-Constant Tables

Each estimator should prepare his own table of constants. If he be conscientious, his own figures will be the only ones in which he will have any confidence; and, indeed, another man's may be seriously in error in relation to the possibly different methods of the estimator's own firm. It is more as an example of the general form in which these labour constants may conveniently be cast that one of a number given in the section on "Estimating" in Pitman's *Electric Wiring and Contracting* is here reproduced:—

Main switch-fuse's c.i. case. Fix and connect on brick.

15A d.p.	1.5	t.p. add 50 per cent
30A ,,	1.75	
60A ,,	2.0	
100A ,,	2.5	
200A ,,	3.5	

The table, it will be seen, is headed by a precise description of the typical item, the extent of the labour to be performed

on it—"fix and connect"—and the normal conditions for which the constants are calculated—"on brick."

The constants are given in "man-hours": i.e., all labour, whether of charge-hands, electricians, or assistants, is reduced to its equivalent in electrician's time, which gives the man-hour constant for that particular job. If the constants are calculated in this way as man-hours, it is easy to translate them into money values for varying electrician's rates.

Not Difficult or Laborious

It is neither so difficult nor so laborious as it may at first sight appear to work out a complete series of these labour-constants, adapted to all the usual requirements of an electrical contracting business. Take, for example, screwed conduit. Any estimator of experience will have a good idea of how long a man and a mate should take to run 100ft of, say, $\frac{5}{8}$in, 1in, and 1$\frac{1}{2}$in conduit. He can, therefore, begin by pencilling against these three sizes the equivalent figure in man-hours and the intermediate sizes can be filled in by tracing a mental curve. That gives him a first rough approximation, which he will adjust, by reference to as many actual costs as are available of jobs where conditions were normal and the labour against those sizes is clearly ascertainable. If the table so constructed gives poor results in practice, he will naturally correct it periodically by checking it against the new figures in his cost ledger.

In compiling these tables, the gross time occupied should always be allowed for. The figures must be based on the assumption of normal conditions: men of average skill, under supervision of average efficiency, working in reasonable comfort and safety, without interruption, and with an adequate supply of the necessary tools. Without such constants, or something very like them, it is practically impossible for the estimator to obtain consistent and reasonably accurate results, unless he be a genius of vast experience, prodigious memory, and an unnaturally equable temperament. With them, the pricing of such an installation as that we are considering is a relatively simple matter.

Dealing first with section (*a*), tables similar to the example give us at once the labour costs of fixing and connecting up the main switches and fuseboards of whatever sizes have been specified. If they have to be fixed on anything but brick, the necessary modification can be made mentally, unless a separate table is available. Extra labour, too, may be needed if rag-bolts have to be grouted in, or soldered connections to be made.

From other tables the labour on the various mains and sub-mains can be priced. The same tables will serve for the pricing of the circuit wiring in section (*b*), if this has been itemized on the basis of the total quantities involved. It is obvious two or more of these tables can be combined to give labour costs per unit run for each size of cable with its appropriate conduit.

Erection of conduit on tiles or patent floors, or on reinforced concrete, will, of course, cost more, and the necessary adjustments may be either made mentally or be the subject of further tables. Any abnormal amount of setting round beams or stanchions must be allowed for; and, if composite tables are used, any departure from normal proportions of accessories or cable per foot run.

Finally, suitable tables will enable us to price the labour against the various items of section (*c*). Here again, time and trouble can be saved by combining certain tables, such as that for fixing switches with that for fixing the boxes on which they must be mounted.

General Expenses

Assuming that all labour and material rates have been filled in and extended into the cash columns we have now only to tackle the last section (*d*), pricing the "general expenses" already itemized. In one way, this is perhaps the most difficult part of an estimate. There are no quantities to work on, and most of the items are in their nature indefinite. No tables or catalogues can help us here.

Items such as travelling time and country money are easy enough. It is less simple to deal with indeterminate items such as "cutting away and making good." Until the job is started and the foreman has "got out" his runs, it is difficult to decide how much of it will be needed; and though it is possible to compile a series of labour constants for chases of different sizes, building

materials vary so much in hardness that they could only be very rough guides.

"Contingencies" is another difficult item to estimate, and calls for very careful judgment. It may be almost neglible; it may, if there is any element of chance about the working conditions, be very heavy. In any case, it is best expressed as a percentage of the total cost of the other sections. As for other items, such as consumable tools or special tackle, the estimator can only use his discretion based on experience.

We will assume, then, that every item of the cost has been priced, and the two columns of labour and material have been totalled. If the specification calls for separate prices for different sections, the total of the "general expenses" section should now be split up proportionately among the others, and the resulting totals dealt with as so many separate estimates. For our present example, however, we have only to submit a lump sum for the whole job, so we need now only add the totals of the columns to arrive at the *net* cost of the job, excluding the out-of-pocket expenses and any provisional sums.

Checking Results

Before going farther, it is desirable to check the results so far obtained. The actual figuring can be checked by an assistant or clerk. The quantities and general results can be tested in several ways and each estimator has his own methods. He will, for instance, know the average proportion of labour to material for installations of different kinds—on house wiring it is usually in the ratio of two to three—and if he found his present results were markedly different he would be led to investigate the cause.

Other simple checks are the number of man-hours per point—e.g., eight for offices, seven for small houses, six for factories; the total cost per point, alluded to earlier; and the average length of run per point—say, 18ft for typical office buildings. It is quite possible, too, to plot graphs showing the average cost of installation as a function of the cubic space or floor area of a building and the lighting or heating intensity required.

We have so far no more than the total *net* cost of the job. It is not the true cost. The true cost of any job is the net cost *plus* its fair proportion of the "overheads," the standing charges of the business. Some firms prefer to vary the percentage necessary to cover them according to the size of the job, arguing that certain overheads do not increase in proportion to the amount of the contract, and that a large order by increasing the turnover reduces their percentage. Others add different percentages to the material and the labour, or add one only to the labour. None of these methods, however, is so simple and logical as that of adding to the total cost a uniform percentage—to be discussed in a later article.

Adding the Profit

And now we have only to consider the question of profit. That is usually added in the form of another percentage on what is now the gross, or true cost of the job. The contractor's decision on the amount of it will be affected by many factors: the size of the contract, the degree of competition, the state of his turnover, the possibility of obtaining remunerative extras, his anxiety to secure a particular connection, and so on. If he has made out his estimate accurately, he will know that, however small the added percentage of profit, he will at least not suffer actual loss. It only remains to add any provisional sums specified, and any out-of-pocket expenses at net cost, and the estimate is complete. If an order follows, the matter is out of the hands of the estimator and in those of the supervising engineer.

If, on the other hand, the order is lost, it is useful, as a guide to future estimating for similar work, to make a note of the amounts of the tenders submitted by other firms, often published or communicated. A study of the percentage of difference between their figures and his own will show the contractor whether he is consistently over-estimating, and help him to readjust his constants or his normal percentage of profit accordingly. So in defeat he may find future victory.

Electrical Exports to Colombia

AN economic survey of Colombia prepared by the Board of Trade (H.M. Stationery Office, 1s 3d) shows that the value of United Kingdom exports to that country of electrical goods and apparatus increased in value from £10,000 in 1938 to £110,000 in 1947 and £168,000 in 1948.

Philip Sporn Power Station

High Thermal Efficiency

FROM 15th December, when the first unit at the Philip Sporn station of the American Gas & Electric Co. was put into operation, until 12th April, the *Electrical World*, states, average heat consumption was 9,411 B.Th.U./kWh net, despite poor coal (owing to a coal-mines dispute) and some tuning-in difficulties. On one check run, with a gross production of 151,000 kW, the net output to feeders was 143,000 kW. Coal rate is given as 0.8344 lb/kWh (11,129 B.Th.U./lb) and heat rate 9,286 B.Th.U./kWh. Boiler efficiency was 89.85 per cent and thermal efficiency 36.77 per cent on a sent-out basis.

The station's ultimate "feeder capability" is to be 900 MW in six sets of 150 MW. The second unit is ready for commissioning and two more will be available in 1951 and 1952. When the last two are installed the output will exceed 6,000 million kWh per annum. Steam conditions at the inlets of the cross-compounded turbines are 2,000 lb/sq in and 1,050 deg F. After passing through a 42.7 MW 3,000 r.p.m. component, steam is reheated to 1,000 deg F (automatically controlled) at 400 lb/sq in before entering a 109.8 MW 1,800 r.p.m. tandem-compound machine with double-flow exhaust section; the final moisture content of the steam is 6 to 7 per cent at full load. There are seven bleed-points for feed-water heating.

930,000 lb/hr Boilers

Alternators of each set will be controlled as a single unit and the generated voltage of 13.8 kV will be stepped up (without intervening switchgear) by three-phase transformers to 138 kV for the first three sets and 300 kV for subsequent sets. The full output of the alternators is obtained when cooled by hydrogen at 25 lb/sq in. Heat lost in the windings is recovered in the feed system for part of the year. A single pulverized-fuel-fired dry-ash bottom boiler, with a continuous rating of 930,000 lb/hr at 2,300 lb/sq in and 1,500 million B.Th.U. input, supplies steam to each turbine without header connections and with only turbine stop valves. Forced draught only is used. The economizer is of a size only sufficient to provide the small amount of gas cooling required between the superheater and the air heater.

Make-up feed water (1½ per cent at full load) is provided independently of turbine loading by compression distillation, which embodies a heat pump with a performance co-efficient of 15 to 20—equivalent in thermal results to a quadruple-effect evaporator. Superheat and reheat temperatures are maintained at fractional loads without increasing gas temperatures in the system by a new principle of recirculating a portion of the flue gases, which provides for less heat absorption in the furnace and more in the convection pass; e.g., at half-load gas recirculation of 17 per cent gives a net heat-rate gain of 2.2 per cent. Circulating water for the ultimate six units will amount to 675,000 gal/min at 69 deg F.

Nearly 200,000 tons of coal a month will be burned at the completed station, which is adjacent to a coalfield with an estimated potentiality of 90 million tons. Initial development will provide 600,000 tons of washed coal a year, without freight costs; the remainder will be obtained for the time being by short river transport from existing local mines. Building space for the six units will amount to 22.9 cu ft/kW.

Isotope Separator

A SECOND electromagnetic isotope separation plant has just been completed at the Atomic Energy Research Establishment at Harwell, and the collection of separated or enriched isotopes has begun. A small separator of this type has been running at Harwell for about two years and has been supplying samples of isotopes of light elements for nuclear physics work.

The new plant is capable of separating for experimental work gram quantities of the heavy elements, including uranium, at a high degree of enrichment. It has been designed by a group of scientists at Harwell and manufactured by the Metropolitan-Vickers Electrical Co., Ltd., in conjunction with the General Electric Co., Ltd., and British Thomson-Houston Co., Ltd. While this plant is expected to be fully occupied on work for the Establishment for some time to come, milligram samples of light elements made by the smaller plant will be available for export, as well as for use in Britain, depending upon the supply position.

Poultry Farming

Present-day Applications of Electricity

THE immediate future of poultry farming depends to a considerable extent on the Government's policy in regard to the availability and cost of feeding stuffs. Given the necessary food at an economic price British poultry farmers could produce all the eggs the country needs.

Of importance almost equal, however, to that of foodstuffs, but not so immediately obvious, are the availability and increased application of electricity. Without its assistance no poultry farmer can hope to produce eggs and breed or rear birds for stock or table so economically and conveniently. This fact will make itself more and more apparent as competition increases, as it inevitably will, and the more go-ahead members of the industry are constantly on the look-out for new ideas for utilizing electricity to reduce labour and costs, while at the same time securing increased and uniformly good production.

The well-known saying, "What Manchester thinks to-day, London will think to-morrow," might well be developed, when speaking of the poultry industry, into "What Lancashire does to-day, the rest of the country will do to-morrow." By this, we do not mean to say that certain other parts of the country are not as fully advanced in their ideas, but Lancashire, being what might be called the home of poultry farming (before the war its poultry population was over ten million—or about one-fifth of the country's total), has a very strong influence on the general adoption of new techniques.

For this reason we recently spent several days in Lancashire visiting as many and as varied a selection of farms as possible, between them covering practically every branch of the industry. Much of the information we shall give does not, of course, contain any especially new features and is to some extent repetitive, but it will help to provide a

Our title picture shows Mr. G. W. Roberts' farm at Clitheroe

general indication of the methods and types of equipment favoured.

With the problem of "Which came first, the egg or the chicken?" still unsolved, we are influenced to refer first to commercial egg production by the fact that it is in this branch of the industry that there has been the greatest activity in developing new methods and where there is the greatest scope for controversy.

"Mechanized" Feeding

On some modern commercial egg-producing farms we are far indeed from the days when a hen roamed the fields and periodically returned to her nesting-box to lay her eggs. Under one of the most up-to-date systems, such as Mr. J. Hough has at New Hey Farm, Newton, near Kirkham, all she has to do is to stand in her sloping wire-bottomed cage, eat and drink for four and a half minutes every half-an-hour as food and water pass by the front of the cage, and finally lay eggs which roll down ready for collection in front of the cage. Her score is marked up on a card and if it falls consistently below three a week her cage has a new tenant. The usual laying-life is about fifteen months, after which the hen is in prime condition for the table.

The hens are apparently quite happy under these unnatural conditions—Mr. Hough says that they would not lay if they were not—and give consistently good results. Six eggs a week is quite usual and one bird has actually laid 361 eggs in 365 days. This method of egg production is, however, an economic proposition only if undertaken on a comparatively large scale. In Mr. Hough's case there are two banks of "Patchetts" batteries, three tiers high and seventy cages long each tier side, the total capacity therefore being 840 birds. Fractional-horse-power motors automatically take the food and water backwards and forwards past the cages. Droppings are carried away and collected once a day in a few moments by means of a continuous band conveyor, also electrically operated, while the cages are cleaned out by a Wolf industrial blower. The hen's working day is extended in winter by the use of artificial lighting, which, like the food conveyor, is time-switch controlled. The installation was carried out by C. E. Crookall, Ltd., Poulton-le-Fylde.

The battery system of egg production has also been adopted by Mr. T. Schofield, of Shadsworth Road, Blackburn. In this case, however, the four three-high batteries each holding 360 birds are not equipped for automatic feeding. Mr. Schofield does not approve of the latter, contending that it does not permit individual control of feeding.

A record of laying is kept by altering the position of clips on the cages. Mr. Schofield also keeps his hens between one and two years, but says that it is usually more profitable to dispose of them after one year, since there is no moulting to worry about and they can be sold at the best price. In favour of the battery system he also points out that no washing of the eggs is necessary. The cleaning away of the droppings from the whole 1,440 birds can be carried out in 2½ minutes. The 180ft long battery houses are safeguarded from frost by five 2 kW thermostatically controlled immersion heaters which, with the aid of circulating water pipes, maintain the temperature at about 36 deg F.

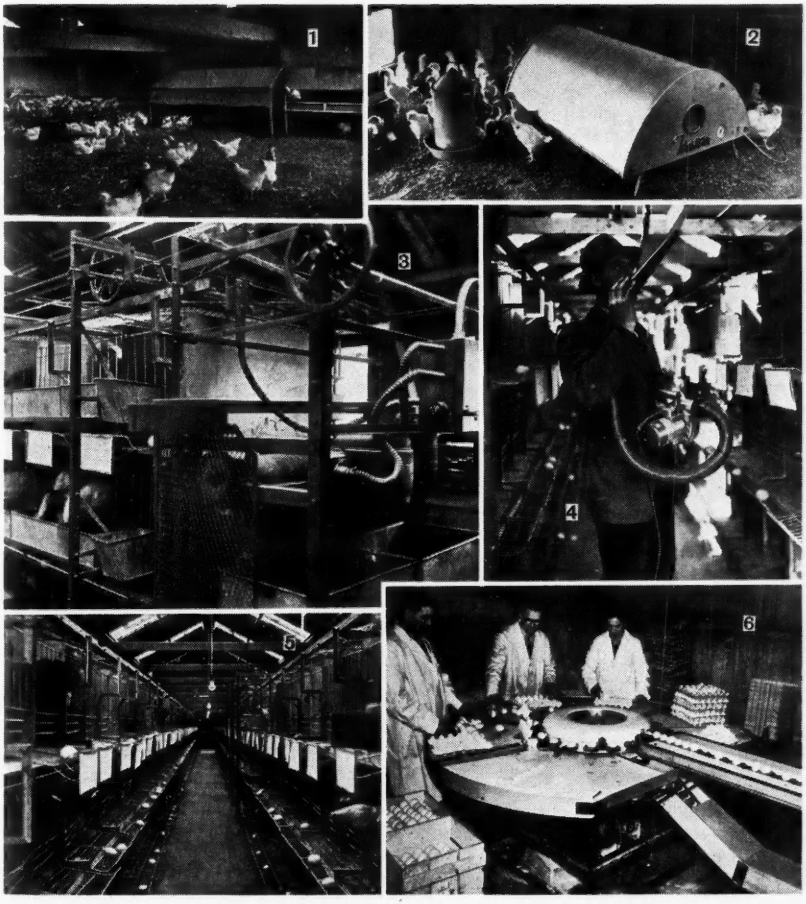
Deep Litter System

An even more recent method of egg production can be seen at H. Sutton and Sons' farm at New Moss Hill, Moss Lane, Hoole, near Preston. On this large-scale poultry farm, where about 8,500 head of birds (including ducks) are kept, the battery system has been discontinued and in its place the deep litter system popular in the United States is being tried out. Under this arrangement hens reared in the spring and ready for laying are brought into cabins in July or August while the weather is still warm. The floor is covered with wood shavings, sand and hydrated lime, which serves the dual purpose of neutralizing the droppings and raising the temperature. No artificial heating is required throughout the winter, during which the birds remain permanently inside and produce eggs at the time when they fetch the best prices. The litter is gradually built up but is not cleared out until about March, when the hens are sold for the table.

The cabins are provided with artificial lighting with time switches arranged to give the birds fourteen hours of light preceding sunset. Fluorescent lamps furnish the main illumination but, to avoid

scaring the birds with the flicker when switching on, a tungsten lamp is put on first. The use of quick-start fluorescent lamps would render this unnecessary.

A building 120ft by 22ft accommodates 800 birds and although rather more space is required than is the case with batteries, the birds need less attention. Mr. H. Sutton says that one man would have no difficulty in looking after 8,000 birds, whereas he could not cope with more than about 3,000 in batteries. On the other hand, those farmers who do not favour the deep litter system point out that it is impossible to keep a check on the output of individual birds, and that a certain amount of cannibalism and egg-eating is unavoidable. Some, too, consider that this system sacrifices cleanliness. Mr. Sutton is convinced, however, that the new system will render the battery method obsolete and states that egg



(1) Egg production by the deep litter system at Mr. H. Sutton & Sons' farm, Hoole. (2) Western hovers in use at Mr. G. W. Roberts's farm, Clitheroe. (3) The driving mechanism for the battery feeders on Mr. J. Hough's farm. (4) Cleaning out battery feeders with the aid of an electric blower. (5) Battery feeders on Mr. J. Hough's farm. (6) Automatic electrically operated egg grading and marking apparatus at Mr. H. Sutcliffe's egg-packing station, Cliviger

production is equal to that in battery cages with less trouble and expense.

After the cabins used for the deep litter system have been cleared out in March, Mr. Sutton uses them for rearing chicks straight from his three 6,480-egg Papworth incubators. For this purpose the floor is heated to about 95 deg F by means of 1¼in hot-water pipes set in concrete 14in apart. These are believed to be the first poultry houses in England to have been equipped with radiant-heated floors. The same method of heating is used in the hardening-off houses.

Solid fuel is employed for heating the water, but an electrically operated automatic stoker and circulating pump are in use, the flow water being thermostatically controlled to about 140 deg F.

The use of heated floors for rearing chicks raises the question of the practicability of employing electricity for the purpose, and we understand that experiments to this end are being carried out at the Lancashire County Council Farm Institute with the assistance of the North Western Electricity Board.

Turning to the hatching side of the industry, it seems that all-electric incubators are now employed almost exclusively on the modern farm wherever electricity is available. So good are the insulation and heat storage qualities of the modern apparatus that farmers no longer have any fears of damage to the eggs in the event of temporary supply failures.

Cleanliness Assured

On the other hand, in hatching, too much emphasis cannot be placed on the importance of cleanliness, in which, of course, electricity scores heavily. Striking evidence of this is to be found at Siddow's Farm, Clitheroe, where Mr. G. W. Roberts, a constant prize-winner for chicken rearing, regularly secures by special attention to cleanliness, hygiene and fresh air, a 92-95 per cent hatch in his 6,000-egg Stephens incubator. On occasions he has had every egg in a tray hatch out, and the soundness of this stock can be judged by the fact that in one instance all but one of 100 day-old chicks he had sold were alive a year later.

To achieve these striking results Mr. Roberts uses eggs only from his own stock of 750-800 Rhode Island Reds and White Leghorns. Average annual incubations number about 25,000. Those chicks which are not sold as day-olds go to "Visi-Chick" four-tier electrically heated brooders, each tier accommodating one hundred. Initally the temperature is maintained at 90 deg F, being gradually brought down to 60 deg F by the time the chicks are ready to be transferred to a hardening-off house. Warmed by a Western hover (maximum temperature 80 deg F), this is their home for the next fortnight, during which, in suitable weather, they are encouraged to go into the fresh air. At five weeks old no further artificial warmth is provided.

Large Annual Consumption

Altogether, including the use of two 2½ kW G.E.C. fan heaters, the total consumption of electricity for heating amounts to just over 10,000 kWh a year. Another 700 kWh is used for power required for operating an "Adelphi" food mixer, a milking machine, and other farm appliances. In addition, 7,500 kWh is used in Mr. Roberts' all-electric house.

Operating in a comparatively small way, hatching only eggs produced on his farm and being in a position to give almost individual attention to his stock, it is natural that Mr. Roberts should obtain a specially favourable result.

Hatching out 12,000 chicks a week in his 64,000-egg capacity incubators, Mr. H. Sutcliffe, of Pot Oven, Holme, Cliviger, using eggs collected from a number of farms, is satisfied with a two-thirds hatchability. Incidentally we were told some most interesting facts regarding fertility. Apparently in early spring and June the proportion of pullets and cockerels is about equal, but in the autumn-hatched chickens there are 5-10 per cent more pullets than cockerels, the position being reversed in April.

Chicks not sold as day-olds are kept in tiers of electrically heated battery brooders, in which accommodation is provided for 4,800 birds for sale at one month old. Apart from hatching, Mr. Sutcliffe runs an egg-packing station, employing electrically operated grading, testing and marking apparatus; last year he handled 14 million eggs.

Further details of the latest methods of incubation, brooding, etc., now employed in Lancashire will be given in a continuation of this article.

Industry and the House

Debate on Electricity Reports

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

THE final three weeks of the current Parliamentary session have been dominated by the worsening international situation. While in the course of its business Parliament has discussed many other subjects, Members have been so concerned with developments in Korea that debates which would normally have been provocative have been conducted in a calm, almost absent-minded, manner.

The debate on the British Electricity Authority—the first to take place in Parliament — suffered through being placed between a debate on civil defence and one on military defence the following day. In addition to this, the proceedings were interrupted at 7 p.m. for an hour for the report stage and third reading of the Gloucester Extension Bill. All in all, the debate never had a chance of success.

Public Control

During the passage of the nationalization Bills in the last Parliament, the Government said again and again that nationalization of industries would afford full public control of them through Parliament. The Minister would be responsible for the particular industry and he would be answerable to Parliament for its conduct. In practice this has worked out badly. The Minister of Fuel and Power, like his predecessor, has refused to answer questions on the day-to-day management of the British Electricity Authority. Although the Authority has been in existence for over two years the debate on the 25th July was the first occasion which the Government has provided for a Parliamentary discussion on the working of the Authority.

The Minister opened by making a comprehensive review of the task of the Authority and its programme for expansion. He also treated the House to an exposition of the magnitude of the problems surrounding the construction of new super stations, referring especially to the difficulties of siting. The Minister's speech added little to the comprehensive report issued by the Authority at the end of last year. The ensuing discussion therefore turned mainly upon the past as revealed by the report.

Mr. Geoffrey Lloyd, who was Minister for Petroleum Warfare in the Coalition Government, opened for the Opposition by saying that "the Minister had made a notably unaggressive defence of the B.E.A." The lower charges which Labour had promised as one of the fruits of nationalization had not materialized and charges had, in fact, risen by almost 1s in the pound since electricity undertakings had passed into public ownership.

In the debate those Members who were fortunate enough to catch the Speaker's eye referred to individual points which they considered important. This must inevitably leave the impression of a ragged debate and it is far from certain that even the principal aspects of the policy of the B.E.A. were adequately covered.

Scotland and North Wales

Such is the haphazard nature of Parliamentary debate that the whole of the work of the North of Scotland Hydro-Electric Board for 1949 was referred to only once, and then by one Scottish Member (Lord Malcolm Douglas-Hamilton) in the course of a nine-minute speech. Lady Megan Lloyd George pleaded eloquently for the protection of Snowdonia from excessive hydro-electric development and she was reassured by the Parliamentary Secretary (Mr. Robens) in his winding up that a Bill would in any case have to come before Parliament before work could commence. (He did not remind the hon. lady that when a similar outcry was raised over the Tummel-Garry

scheme in Scotland the Government Whips were put on to force the necessary legislation through the House.)

A remarkable feature of the debate was that four lady members spoke, Mrs. Barbara Castle, the Labour M.P. for Blackburn, making a stout defence of the Consultative Councils. Only a few days before, the annual reports of the Domestic and Industrial Coal Consumers' Councils had appeared. These demonstrated the ineffectiveness of such a device for protecting the true interests of consumers. Nevertheless, Mrs. Castle considered that we "are much nearer to getting a really effective consultation" for electricity supply.

Sir Arnold Gridley wound up for the Opposition with a warning of the risks of breakdowns at substations and with the statement that the tempo of development through the country had been definitely slowed down.

Mr. Robens reminded the House of the earlier similar debate which had taken place on the report of the National Coal Board for 1949. There was no doubt that low-grade coal would continue to be mined in this country and it was essential that the new power stations of the B.E.A. should be able to make full use of this lower grade fuel.

The House will be in recess until Tuesday, 17th October, unless developments in the international situation make an earlier recall necessary.

GAS-TURBINE PATENTS

Restatement of Policy and Method

THERE is probably no more complete misnomer than the name of Power Jets (Research and Development), Ltd., which neither conducts research nor undertakes development work.

All the shares of this normally constituted "private" company are owned by the Government and its directors are appointed by the Minister of Supply, but, except in respect of broad policy, they are free to manage the company as an ordinary business concern.

The main objects are to own and manage patents relating to gas turbines and certain other associated equipment which may result from publicly financed research and development. The company consequently acts, first, as technical consultant to clients who may be expected to become licensees when they embark upon manufacture on an industrial scale, and, secondly, operates a School of Gas Turbine Technology, which is at Farnborough, Hants.

The company endeavours in these ways to foster gas-turbine progress and, at the same time, to emphasize British enterprise. There is no question of supplying visible goods; instead, the company aspires to "sell British patented technology" abroad with the purpose of liberating to home industry inventions which, if privately owned, might have the effect of retarding technical advancement.

The general purpose of patent management in these ways is to reap a proper income from abroad and to prevent foreign ownership limiting British industrial progress. About 2,500 patents and patent applications in about 15 countries relating to some 400 inventions are held by this company, whose policy is to grant non-exclusive and non-discriminating licences to develop and manufacture.

Mr. W. E. P. Johnson, managing director of the company, believes that U.K. makers will not be able to supply all the gas turbines which will be needed in every market of the world. His endeavour is, therefore, by teaching and patent licensing, to make foreign manufacture dependent upon British technology and, in this way, to correct any lack of respect for the knowledge and experience of gas turbines which Britain clearly possesses.

The industrial gas turbine has not been so well launched as the aero-engine gas turbine, but those who suppose that the latter has little to contribute to the development of the former seem to ignore the fact that a gas turbine is not a unique element, or machine, but a system which is a combination of refined elements such as compressor, furnace, turbine, heat-exchanger; the first three of which have in the case of the aero-engine been developed greatly beyond their orthodox industrial counterparts.

Each of these pieces of equipment is now separately capable of much better performance than ever before, thus rendering the combination one of the most adaptable prime movers, or heat recoverers, so far devised.

Southampton Ocean Terminal

Extensive Electrical Equipment

REMARKABLE electrical facilities have been provided at the new quarter-mile long Ocean Terminal of British Railways (Southern Region) which the Prime Minister, Mr. C. R. Attlee, opened at Southampton Docks on Monday. Four reversible passenger escalators (J. & E. Hall) between the ground floor and the waiting halls above have been arranged to deal with 4,000 persons an hour, and there are four inclined reversible baggage conveyors (Sovex) of the wooden-slat type. Both escalators and conveyors are driven by Lancashire Dynamo screen-protected motors of 16 b.h.p. and 10 b.h.p. respectively with Allen West contactor control gear.

In addition there are twenty combined goods and passenger 30-cwt lifts (Hammond & Champness) of the two-speed (20ft and 120ft per minute) push-button-operated type driven by Bull 15 h.p. tandem motors comprising both slip-ring and s.c. units built into the same frame on a common shaft. Automatic self-levelling is obtained by the use of "Pliotron" units, the car gates and landing doors opening automatically when the car stops.

Three pairs of light alloy telescopic gangways (made by Structural & Mechanical Engineers, Ltd.) mounted in twin turrets, and capable of traversing along the platform of the building in order that accurate alignment can be made with the various gangway ports of different ships, link the vessels and the upper floor of the Terminal. The gangway portions can be parked in alignment with the building, thus permitting quayside cranes freedom of movement throughout the length of the berth.

Electric Heating

All the offices and waiting halls are heated electrically. The waiting hall heating is combined with the ventilating system by means of heater banks in the main ventilating trunking, the total heating load being 733 kW with about 25 b.h.p. of fan loading. The heater banks are controlled by multi-point thermostats around the walls. The offices are equipped with wall-type convectors and tubular heaters.

Indirect lighting by cold-cathode fluorescent tubes have been used effectively by Maple & Co., Ltd., for the first floor waiting halls, two lines of warm white and one line of amber tubes in the cornices giving an illuminating intensity of 7.5 ft-candles at the normal working plane. Approximately 4,500 8ft 6in tubes with a total loading of 210 kW have been overlapped to give a continuous light source. Auxiliary lighting comes from 300 W tungsten fittings in the ceiling.

In the Customs halls 600 5ft 80 W fluorescent tubes (B.T.H.) give an intensity of 12 ft-candles at the benches, auxiliary lighting coming from 500 W dispersive reflectors. Direct tungsten lighting from 400 points (115 kW loading) has been used for the ground floor area, intended mainly for large handling. For the sightseers' enclosure, etc., 150 W tungsten lamps are fitted in prismatic bulkhead fittings. Gangway lighting has been undertaken by Thorn Electrical Industries, Ltd. The external lighting of the building is by means of Simplex scuttle-type 200 W floodlights and Benjamin 1,000 W "Duoflux" units.

A comprehensive sound-reproduction installation (Ardente) provides facilities for the relaying of either local or radio announcements or gramophone records over any desired combination of eight different circuits of loudspeakers. Electric clocks by Gent & Co. are installed throughout the building.

Supply Arrangements

Alternative incoming electricity supplies are handled in a separate sub-station by a six-panel board on which is mounted Allen West 150 MVA h.r.c. 400 A hand-operated switchgear which feeds three English Electric transformers (two 500 kVA and one 250 kVA), space being provided for a fourth 500 kVA transformer later. As this apparatus is accessible only to authorized persons of the Electrical Engineer's Department, the outgoing cables from the transformers are taken to a central switchroom under the control of the operating staff of the passenger terminal. Here four Allen West oil circuit-breakers feed J. G. Statter & Co. and English Electric switchboards serving the various sections of the building.

The wiring installation has been carried out in galvanized conduit with v.i.r. cables. All fuses below 100 A are Siemens "Z" type and all over 100 A English Electric h.r.c. type.

World Power Conference—IV

Special Methods of Power Generation

IN the earlier articles of this series attention was given to the generation of electrical energy by the usual thermal and hydro-electric plant. Due to a variety of causes, however, increasing consideration is being given to the production of energy by other means.

A whole section of the papers presented at the Conference is devoted to gas turbines and jet engines in relation to power production and aircraft propulsion. D. M. Smith, of the Metropolitan-Vickers Electrical Co., Ltd., thinks that in Great Britain, since oil has to be imported, there will be no widespread scope until we can make gas turbines to burn coal with an overall economy not inferior to that of competitive plant.

Coal-burning Gas Turbines

Several possible methods are outlined:—

(1) To make use of external combustion at atmospheric pressure, heat being transferred to the working medium through a combustion heat exchanger and products of combustion being exhausted directly. The combustion heater will have to be as large and as costly as a steam boiler; initial operating difficulties of such a plant are likely to be few, however, and the idea is applicable to both open and closed cycles.

(2) To burn coal internally in the open-cycle turbine. The chief difficulties are corrosion and erosion of blades and the formation of deposits on them. A recent American development has as its basis the burning of crushed coal in a cyclone burner, as an alternative to pulverization.

(3) A combination of the above "external" and "internal" combustion systems with heat transfer in a pressurized combustion zone from an open-cycle circuit. While the technical problems would be the same as in (2) for the "internal" part, a cheaper plant, with lower maintenance costs, might be realized than with external combustion at atmospheric pressure.

(4) To gasify the coal and burn the gas resulting from carbonization internally in a gas turbine. The economics of the method are complicated, depending on whether it would be preferable to recover by-products and run the turbine at a comparatively low efficiency or to ignore by-products and run at a higher efficiency. The extent to which ash-cleaning and de-tarring apparatus will be needed depends upon the quality of coal to be used. The gas turbine with pressure-producer would seem to be a good way of using up low-grade coals.

Future Developments

So far as present trends indicate, the coal-burning gas turbine is not likely to challenge the steam turbine for large base-load stations; but rather to be useful for moderate-sized installations. The capital cost of coal-burning gas turbines exceeds that of those burning oil, which may therefore hold the field if the load factor is very poor.

Some of the most interesting proposals, however, relate to the combination of gas turbines with steam plants. As auxiliaries, gas turbines have applications such as providing pressurized combustion in oil-fired steam boilers. In small stations using reciprocating internal combustion engines as prime movers, gas turbines are also used for driving turbo-superchargers.

More elaborate ideas include gas turbine-reciprocating engine cycles in which the gas turbine generates the external power; other proposals envisage cycles in which gas turbines, reciprocating engines and steam plants are combined. Suggestions have been made also for gas-steam cycles with coal firing. The main obstacles in the way of obtaining working knowledge of these schemes is their very high development costs.

In America, one of the large fields for the future application of gas turbine plant is likely to be the railways, where in recent years diesel-electric locomotives have been widely used.

Among the technical features which call for comment are the general adoption of axial-flow compressors and the preference for open-cycle working to closed-cycle. The former has a higher efficiency, but the centrifugal compressor has, as Dr. Roxbee Cox points out, a robustness and flexibility which should be valuable when coal-burning gas turbines are being developed. The free-piston compressor is another possibility. The preference for the open cycle is probably due to a wish for simplicity and to a remembrance of aircraft gas turbine designs, for which it is particularly suited. Yet if a boiler employing atmospheric air for combustion can be used in the closed cycle, there will be no problems due to corrosion and blade deposits caused by combustion products. The chief support for the closed cycle, among the Conference reports, comes from M. Keller, Escher Wyss, Ltd., Zürich. Mention may also be made of another Swiss author, M. Karrer, whose valuable paper includes important examples of gas turbines in combination with back-pressure or condensing steam plant, in one of which cases an overall efficiency of 40 per cent is expected.

Atomic Energy

The organizers of the Conference decided to include a Section of papers on atomic energy. They ran the risk of receiving papers of little technical value, owing to the operation of security regulations, but succeeded in bringing together a series of reports from countries which are active in this field; moreover, the standing of the authors is unassailable. The contributing countries are: Great Britain, Canada, United States, France, and Sweden.

The consensus of opinion seems to be that, at first, dual-circuit systems will be used in power plants. In the primary circuit, heat will be transferred from the reactor to the motive fluid of a heat-engine circuit. The only known medium that seems to be possible for the motive fluid is helium, which would have to work in a hermetically sealed system at several hundred pounds per square inch. The constructional and maintenance difficulties are likely to be aggravated by the need to house the entire plant inside a protective casing. How to tackle unexpected breakdowns, with their possibly very serious consequences, is not yet clear.

It may, however, be possible to arrange for the circulator to be entirely encased within a pressurized vessel containing an atmosphere of helium, the pressure of which is suitably related to that of the primary circuit.

Two formidable problems are (*a*) the prevention of leakage of helium and (*b*) the lubrication of the moving parts with oil, while at the same time preventing escape of some oil into the atmosphere surrounding the working parts within the pressure vessel. The radiotoxicity of the leakage is a further matter to be dealt with.

It seems a pity that the possibility of an evaporative-condensing cycle does not commend itself more to the experts in this field. Mr. Norman Else, in commenting on the American paper by W. F. Davidson, points out that, subject to the solution of the nuclear problem, a cycle of this kind avoids the need for moving machinery in the primary circuit. An objection, apparently, is the creation of control problems; but would these be any more troublesome than problems inseparable from the use of moving machinery for sustaining circulation?

Until vast sums of money have been spent on preliminary development programmes, it will be impossible even to guess the likely capital and fuel costs of an atomic energy plant for generating electric power.

Other Sources of Energy

Finally there was the very diverse group of papers headed "Other Sources of Energy." Perhaps the heat pump progress report from the United States by Mr. Philip Sporn was the least unfamiliar. Various electricity supply undertakings are actively supporting research and development of this method of heating buildings. It seems likely that, with the increasing restrictions which are being placed on the use of water, air and the earth as sources are likely to figure more in future plants. There is also a generating station named after Mr. Sporn himself, in which solar energy is being used for a heat pump.

An idea developed in France is to utilize the thermal energy in sea water, taking advantage of the difference in

temperature between the upper and lower levels. The principle is to use a boiler heated by water at 82 deg F, supplying a turbine with steam at the corresponding pressure and exhausting into a condenser cooled by water at 46 deg F. The plant would naturally be very bulky; a 7 MW machine would need 353 cu ft of cooling water per second, necessitating pipes nearly 8¼ft in diameter to convey the cooling water. A generating station (on land) embodying this principle is to be built at Abidjan, Ivory Coast, Africa. The vertical-shaft turbine rotor will be 26ft in diameter, running at 600 r.p.m. Two sets, each of 3.5 MW capacity, are envisaged. The alternators will be of the normal hydraulic type.

Wind power is attractive in the British Isles, particularly along the western coasts where the highest mean annual velocities are attained. The British Electrical and Allied Industries Research Association has investigated many different forms of wind turbine.

Tidal power was also considered at the Conference (in the presentation of papers on hydroelectric power) as a source of energy. It is variable, intermittent and, as Sir Edward McColl points out, has no kilowatt value. But tidal power follows a known cycle of events and scores over wind power in that it can be predicted accurately for a year ahead or more. Sir William Halcrow referred to the great discrepancy between the output of spring and neap tides as one of the chief drawbacks and remarked that economical tidal power requires a high tidal range and a large tidal basin which can be dammed cheaply. Under other conditions it is expensive.

Finally, there is an account from Italy of the progress made in harnessing natural steam from volcanic regions for the generation of electric power. This idea has been adopted in Tuscany to an increasing extent during the last 22 years. However, the advantages of the project are fortuitous and, while the condensing or back-pressure turbines employed are of interest, there is no possibility of any wide application of the system.

Delegates' Visits

Post-conference day and half-day excursions, in addition to those already mentioned, included visits to the Barking, Kingston, Battersea and Fulham power stations; the national grid control centre and the B.E.A. experimental 275 kV line at Leatherhead.

The National Physical Laboratories, General Electric Co., Ltd., Wembley, Marconi's Wireless Telegraph Co., Ltd., Chelmsford, British Insulated Callender's Cables, Ltd., research laboratories, Johnson & Phillips, Ltd., Charlton, Enfield Rolling Mills, Ltd., and Enfield Cables, Ltd., Brimsdown, Elliott Bros. (London), instrument makers, British Electric Transformer Co., Ltd., Hayes, and Hackbridge & Hewittic Electric Co., Ltd., Hersham.

News from Australia

THE State Electricity Commission of Victoria reports that whereas in 1939 production of electricity was 989 million kWh, in 1949 it had increased to 2,148 million kWh, and it is estimated that by 1954 the production will have risen to 4,250 million kWh. Consumers supplied in 1939 numbered 372,160; in 1949 they had increased to 510,900, and in 1954 it is expected that they will number 630,900. Compared with the average consumption of domestic users of 514 kWh in 1939, last year's figure was 1,294 kWh, and it is expected that by 1954 the average will be 1,685 kWh.

The fourth Kiewa-Morwell loan to raise £3 million for power and fuel developments by the Victorian S.E.C. was opened recently. Interest rate is 3¼ per cent and the term 15 years.

Trade unions are to claim a special "climatic or isolation allowance" of £2 10s a week for workers employed on the Snowy Mountains project. Other claims will include free board and lodging where the employee cannot return to his own home, a living-away allowance and an extra £1 a week above all appropriate Court awards. Twenty-three unions are involved in the claims. There are 1,000 men on the job at present and another 2,000 are expected to be employed by the end of the year.

In a judgment issued recently the Western Australian State Electricity Commission is to pay £288,750 plus 6 per cent interest on that sum since 12th October, 1946, to the Collie Power Co., Ltd., as compensation for the company's power undertaking.

Mr. J. Bridge, electrical engineer of the International Combustion Co. of England, recently arrived in Australia to supervise the installation of boilers and soot blowers at the Fremantle power station.

Commerce and Industry

Action Against B.E.A. Settled

Australian Transformer Contract

IN the High Court on 28th July, Mr. Justice Slade had before him the settlement of an action for alleged libel by Mr. E. C. Mekie against the British Electricity Authority and a senior official of the Authority. Mr. T. G. Roche, for Mr. Mekie, explained that his client while secretary of Edmundsons Electricity Corporation, Ltd., became Liberal candidate for the Leith Parliamentary division. Upon the vesting of Edmundsons' undertakings in the B.E.A. Mr. Mekie was told that he must relinquish his candidature if he wished to remain in the service of the B.E.A. This he declined to do and his employment was terminated on agreed terms, including payment of compensation, for that reason only.

Mr. Mekie took steps to inform his friends and the Leith electors of the reasons for his leaving the B.E.A. but a resident in the Edinburgh district inquired from the B.E.A. whether these reasons were correct. He received a letter, which was read at a public meeting, couched in unfortunate terms which were open to the construction that Mr. Mekie's statements were incorrect. Mr. Mekie then instituted proceedings to clear his name.

Defendants had now assured the plaintiff that they had not intended to dispute the accuracy of his statement. They expressed their sincere regret and had agreed to pay Mr. Mekie an agreed sum as damages and to give him an indemnity for costs.

Mr. Justice Slade said the proceedings would be stayed on the terms agreed.

Window Floodlighting

During the recent work of rehabilitation by the Corporation of London at the Mansion House it was decided to floodlight externally the two stained glass windows in the Egyptian Hall so that they may be seen to the best effect when the interior of the Hall is illuminated. The windows, each measuring 30ft by 13ft, depict in a variety of rich colours the signing of Magna Carta; the assassination of Wat Tyler at Smithfield; Edward VI passing through the City to his coronation; and Queen Elizabeth's procession from the City to Westminster in her state barge.

The problem of lighting these windows was particularly difficult since a maximum offset of only 3ft could be permitted and all light had to be projected upwards to prevent its source being apparent. G.E.C. floodlight projectors were chosen for the installation, and each window is lighted from its base with five "Olympia" floodlights housing "Osram" 1,000 W projector lamps.

Floodlit window at the Mansion House

In addition four floodlights with 500 W projector lamps are accommodated in cornices half way up the sides of the windows. Spill shields have been fitted where necessary. The installation was carried out under the supervision of Mr. George Holliday, city surveyor, his assistant for the electrical design being Mr. H. W. Archer. The electrical contractors were Girdlestone & Co.

Electrical Export Trade

At the July meeting of the B.E.A.M.A. Export Panel, members had the opportunity, at luncheon, of hearing the views of a number of important engineering visitors from overseas. Mr. D. Maxwell Buist, B.E.A.M.A. export director, presided. Among those present were Sir Cecil Weir, chairman of the Dollar Exports Board; Mr. W. P. Dobson, Director of Research, Hydro-Electric Power Commission of Ontario; Mr. E. L. Merigan, Commissioner of the Snowy Mountains (Australia) Hydro - Electric Authority; and Mr. A. H. Harvey, secretary, B.E.A.M.A. China Overseas Committee, who all spoke on their particular subjects. Also present at the luncheon were Mr. A. L. Fielding, advisory and inspecting engineer to the New South Wales Government and Mr. J. Dudley Smith, a member of the B.E.A.M.A. Argentina Overseas Committee. After the luncheon, Sir Cecil Weir

together with Sir Percy Lister, a member of the Executive Council of the Dollar Exports Board, and Mr. D. M. S. Mowat and Mr. D. Widdowson, also of the Board, discussed with the members of the Export Panel problems in connection with electrical exports to the North American markets.

P.O. Engineers' Wage Award

Some 64,000 members of the Post Office Engineering and Supplies Departments are to receive increases that will cost well over a million pounds a year under an award of the Civil Service Arbitration Tribunal announced last week. Those affected are the engineering, motor transport and supplies grades, and the award is back-dated to 1st June.

Commenting on the award, Mr. D. J. W. Coward, general secretary of the Post Office Engineering Union, said that the overall effect of the award was to narrow further the gap between the pay of highly skilled technical staff and lesser skilled staff, and thus to accentuate the problem of adequate pay for higher grade engineering posts requiring special study and training.

Dust and Fumes in Foundries

The Joint Iron Council, in association with the Council of Ironfoundry Associations, has decided to intensify work upon problems of dust and fumes in ironfoundries, and to provide an advisory service. The work is being carried out through the British Cast Iron Research Association. A special "Foundry Atmospheres Committee" of the Research Association is supervising the work. Close collaboration is being maintained with the Joint Standing Committee on Conditions in Ironfoundries set up by the Factory Department of the Ministry of Labour.

Claim for Injuries Dismissed

Judgment was given in the Court of Session, Edinburgh, last week on a claim for £10,000 damages made by Mr. George B. C. McLeod, on behalf of his son, Murdo, against the Minister of Civil Aviation. Evidence was given at the earlier hearing of the case that Murdo McLeod (ten years of age) got into a substation belonging to the Ministry. He came into contact with a bare 3.3 kV conductor and, it was stated, his right hand was permanently mutilated and his left hand severely injured. Mr. McLeod contended that no steps had been taken to exclude the public from the site.

Dismissing the claim, Lord Strachan said that the case must be disposed of on the footing that the boy was a trespasser. Although the Minister had taken no safety precautions at the substation that did not amount to a degree of recklessness which was necessary for liability to a trespasser. There had been malicious interference with the ring-main unit and on three previous occasions there had been damage to the substation gate. In the circumstances those responsible should have taken better precautions, but as he had found that the boy was a trespasser it was not necessary to go further into that matter.

Beverley Minster Lighting

The lighting scheme at Beverley Minster, described in our issue of 24th June, 1949 (page 1086), has now been completed by the installation of the choir lighting fittings. The main lighting installation comprises seventy-two 5ft "warm white" fluorescent tubes located between adjacent shafts of the pillars, control being from a panel in the verger's pew. Special choir lighting fittings consist of oak standards supporting octagonal bronze vase-shaped fittings, each containing a 200 W lamp. Mineral-insulated metal-sheathed cable has been used for the wiring.

All work in connection with the design and execution of the lighting installation was carried out by the staff of No. 6 (Hull) Sub-Area of the Yorkshire Electricity Board.

Electrical Repairs

According to the annual report of the Liverpool Housing Committee, repairs and maintenance of the electrical services in permanent houses cost an average of 2s 10d per house (total £6,370) during the year to 31st March last. The cost of repairs and maintenance in temporary dwellings was £1 17s 2d per house (total £6,501).

Tinplate Workers' Scholarships

A list has been issued by the Education Committee of the Worshipful Company of Tinplate Workers (*alias* Wire Workers) of travelling scholarships and prizes recently awarded. It includes twelve scholarships of the value of £50 each and three prizes of £10.

Brook Motors in North America

An extensive selling organization in the United States and Canada for Brook Motors, Ltd., is the result of a recent tour by the joint managing directors, Messrs. F. V. and J. L. Brook. They found a considerable demand for electric motors in both countries but the standard English design was not acceptable for quantity sale. The company has therefore put into production machines similar in appearance and performance to American and Canadian types which are mechanically interchangeable with

these types. It is stated that in spite of import duties the English motors compare favourably in price, but there is naturally some hostility of manufacturers to the importation of electrical equipment to be overcome.

The company has found it necessary to increase its manufacturing facilities and a further ten-acre factory is to be built in the Barnsley area about 16 miles from the main Huddersfield works.

Engineering Wages Claim

Last Friday representatives of the Engineering and Allied Employers' National Federation and the Confederation of Shipbuilding and Engineering Unions met Sir Robert Gould, chief industrial commissioner of the Ministry of Labour and National Service, for the purpose of discussing future action regarding the unions' claim for £1 a week increase in their members' wages. As a result a small committee was set up to examine possible bases for a resumption of the discussions between the two parties which were interrupted by the unions' decision to conduct the ballot which resulted in a vote against strike action and in favour of arbitration.

Contractors at Agricultural Show

The Tunbridge Wells Branch of the Electrical Contractors' Association took a stand at the Tunbridge Wells and South Eastern Counties Agricultural Show held on 18th and 19th July.

The stand was situated in a dominating position on a bank overlooking the main ring; a marquee was erected for the exhibits. The "In Safe Hands" symbol of the Association was prominently displayed together with another board bearing a list of members of the Branch. A brochure was prepared to hand to visitors also giving a list of the members. The display itself consisted of electric motors, a water pump in operation, a special show piece illustrating a system of farm wiring, together with all kinds of appliances of interest to those attending the show, to the farmer, farmer's wife, and to the ordinary member of the public. The stand was staffed by members of the Branch and their sales staff on a rota system and a number of useful inquiries were secured for following up in the future. The Branch was indebted to certain manufacturers for supplying apparatus and specialist demonstrators.

Stand of the local E.C.A. Branch at the Tunbridge Wells Show

Transformers for Victoria

Partridge, Wilson and Co., Ltd., have secured an order from the State Electricity Commission of Victoria, Australia, for power transformers. The contract was the subject of intense international competition, the chief competitors being Italian manufacturers who offered very low prices and short deliveries. The company succeeded in obtaining part of the total requirement, mainly because of their ability to comply precisely with the specification and to offer a reasonably good delivery. The transformers were of the naturally cooled oil immersed type; 300 are for single-phase operation having a ratio of 22,000/480-240 V rated at 25 kVA, and there are forty 200 kVA transformers (22,000/415-240 V); the frequency in each case is 50 c/s.

The total value of the order is in excess of £53,000, and delivery is scheduled to begin in four months, the whole contract being completed in nine months.

Indian Engineering Exhibition

Further particulars have been received of the Indian International Engineering Exhibition to be held in New Delhi from 10th January to 8th February, 1951. It is being arranged in conjunction with sectional meetings of the World Power Conference, the International Commission on Large Dams, the International Commission on Irrigation and Canals and the International Association of Hydraulic Structures. An important part of the exhibition will be models and photographs of dams,

irrigation works, etc., and there will be an industrial section embracing electrical equipment and applications, particularly those relating to irrigation and agriculture. Space amounting to about 60,000 sq ft will be reserved for foreign exhibitors and import facilities will be provided in respect of exhibits.

Canadian Visitors at Stafford

Ten Canadian engineering professors who are in this country as guests of the British Government, visited the Stafford Works of the English Electric Co., Ltd., on 26th July. They were received by Dr. C. P. Snow, director of technical personnel, Sir Ronald Nesbitt-Hawes, chief of educational administration, Mr. J. K. Brown, director of research, Mr. J. T. Moore, chief engineer, Mr. J. Rogers, general manager of the works, and Mr. R. J. Sanders, assistant commercial manager.

Super-voltage X-ray Therapy

Five 4,000,000 V linear accelerator type X-ray therapy equipments costing between £200,000 and £225,000, are to be used under the National Health Service for the treatment of cancer and other diseases. One of the machines will be in London, another in Scotland, and the remainder in other parts of the country. The first will probably be installed early in 1952.

Radar Equipment for Tankers

In addition to the marine radar equipment installed on the new Anglo-Saxon 28,000-ton tanker *Velutina*, the British Thomson-Houston Co., Ltd., has received orders for similar equipment for her three sister ships. The company is also supplying radar equipments for five new 28,000-ton "CAP" class tankers. Another order, received recently from the British Tanker Co., Ltd., is for the supply of marine radar equipment with an extended mast for six new 28,000-ton tankers at present under construction in British yards.

"Power Laundry" Year Book

New features in the second edition of the *Power Laundry* Directory and Year Book (The Trader Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1, price 15s, postage 6d) include a comprehensive review by Leo Walter, A.M.I.Mech.E., of the instrumentation required for scientific control in the modern laundry and drycleanery, another on economical steam production and usage by D. Coombes, A.M.I.Mech.E., and two sections dealing with working conditions and works restaurants respectively. The buyers' guide, trade directory, proprietary trade names register and machine specifications section have all been substantially enlarged and new tables added to the production and technical data section. The legal guide has been brought up to date, and the layout section consists of an entirely new set of plans. Complete specifications of all the principal machines produced in Britain for laundry and drycleaning factories are given in tabular form.

Radar Terms

To the glossary of terms used in telecommunications (B.S.204) published in 1943, there has now been added supplement No. 4 in order to standardize radar terminology. Copies of the supplement are available for 2s, post free, from the British Standards Institution, 24, Victoria Street, London, S.W.1.

Underground Trolley Locomotives

We have just received from the Production Department of the National Coal Board a copy of Information Bulletin No. EG(50)1 which deals with underground trolley locomotive installations in the Ruhr and has been compiled as the result of a visit to certain German collieries in July, 1949, by a team of engineers representing the National Coal Board and the Liverpool Electric Cable Co. This 27-page report deals with the incoming electricity supply, substation equipment, overhead distribution systems, track arrangements and locomotive design. Conclusions and recommendations are given and there is an appendix quoting a list of mines visited and the German regulations governing the use and control of locomotives underground.

Advertisement Correction

A printer's error occurred in the advertisement of Erskine, Heap & Co., Ltd., in our issue of 21st July (p. 27). In the phrase "Air-break and immersed heaters" the last word should, of course, have been "starters."

Fatal Shock from Drill

An inquest was held recently on Arthur Edward Garbett (25), who was employed as a warehouseman at the works of Ericssons Telephones, Beeston. It was stated that he picked up an electric drill in one hand and junction box in the other, and when the electricity was switched on, received a fatal shock. Mr. C. W. Lacey, power engineer, Beeston, said that he examined the drill and flex. Everything was in good order, but the plug attached to the junction box was disconnected from the wire. It would have been possible for the

earth wire to cross the live points if the plug was ripped off the flex. The plug could come off through the flex being stretched too far. A verdict of "Accidental death caused by electrocution" was recorded, the jury suggesting that some additional form of insulation might be applied to the grip of the drill.

Catalogues and Lists

George H. Scholes & Co., Ltd., Wylex Works, Wythenshawe, Manchester.—Priced folder on "Wylex" switch fuse control units.

Rich & Pattison (B'ham), Ltd., 81, Jamaica Row, Birmingham, 5.—Priced catalogue of industrial domestic and commercial fans.

William McGeoch & Co., Ltd., 46, Coventry Road, Birmingham, 10.—A leaflet on indicator light fittings.

Trade Announcements

A.B. Metal Products, Ltd., have opened a new factory at Ynysboeth, Abercynon, Glamorgan, where more space and a good supply of labour will enable them to cater more efficiently for the demand for their components. The London office at Ludgate House, 107, Fleet Street, London, E.C.4, to which all inquiries should be addressed, has been enlarged.

Pyrotenax, Ltd., has opened offices at Parsonage Chambers, 3, The Parsonage, Manchester (telephone: Blackfriars 6946), under the management of Mr. R. B. Barritt. Instruction on sealing and installation of the company's cable is available in the demonstration department.

The Sales and Administration Departments of the **Stella Lamp Co., Ltd.,** are now housed at the Central London offices, 37/39, Oxford Street, W.1 (telephone: Gerrard 8315/6).

The Sturdy Electric Co., Ltd., is moving its offices and works on 7th August to Sturdy Works, Burnopfield, Newcastle-on-Tyne (telephone: Burnopfield 237).

The controlling interest in the **Rotoplunge Pump Co., Ltd.,** has been acquired by Monitor Engineering & Oil Appliances, Ltd., a company of the Parkinson & Cowan Group. In consequence the offices have been transferred to Flaxley Road, Stechford, Birmingham, 9 (telephone: Stechford 2250). A manufacturing organization is to be set up in Birmingham.

Summer Holidays

The works and offices of Walsall Conduits, Ltd., will be closed from 4th August until Monday, 14th August. A small staff will attend to urgent business.

New Lighting Association

THE formation of a new association of manufacturers of electric lighting and allied equipment is announced by Mr. A. Stanley Shier (a director of Thorn Electrical Industries, Ltd.) who was elected chairman of an acting committee for this purpose at an informal meeting held on 12th July. The meeting was called in response to requests from various prominent firms in the lighting equipment industry "who feel that the present trend of events in the field of distribution indicate the need for a new association whose policy would embody the principles of the Fair Trading Code, whilst avoiding exclusive agreements." A further meeting was held on 25th July when the draft constitution was settled for submission at the first general meeting on 26th September.

The new "National Association of Manufacturers of Electric Lighting and Allied Equipment" will include members of every branch of the lighting industry, including manufacturers of incandescent and fluorescent fittings (decorative, commercial and industrial), lighting auxiliaries and control gear. Among the founder members are Berry's Electric, Ltd.; Dernier & Hamlyn, Ltd.; Ekco-Ensign Electric, Ltd.; Hailwood & Ackroyd, Ltd.; Herman Smith, Ltd.; Frederick Thomas & Co., Ltd.; and Thorn Electrical Industries, Ltd. The Association will not undertake price fixing, but will encourage the maintenance of approved trading terms to contractors and traders while permitting them full freedom to buy where they like. It will promote high standards of workmanship and design and discourage unfair trading.

E.L.F.A.'s Comments

Having seen the above announcement, the Electric Light Fittings Association offers the following comments:—

It is presumed that the "Fair Trading Code" mentioned is intended to mean the "British Electrical Industry Fair Trading Policy," as enunciated by the Electrical Fair Trading Council.

Four of the firms, now named as founder members of the new body, were, until very recently, members of the E.L.F.A., but as they could not agree to operate the Fair Trading Policy they resigned from the Association. E.L.F.A. has strictly observed the Fair Trading Policy in all details from its inception. Furthermore, there are no restrictive arrangements between the E.L.F.A. and the electrical contractors and retailers, as implied by the statement.

The whole of the E.L.F.A. trading policy has been built up in close collaboration with the other organized sections of the trade, and within the framework of the E.F.T.C.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

The General Electric Co., Ltd., announces that group profits for the year ended 31st March amounted to £4,471,692, which is £676,093 more than in the previous year. After providing for U.K. and overseas taxation (the former increased from £1,877,973 to £2,378,017) the consolidated net profit attributable to the holding company is £1,709,404 (£1,494,677). Of this sum £1,498,680 comes into the accounts of the holding company and this, with the addition of the balance of undistributed profits brought forward from last year and income received relating to previous years, gives a total amount available for appropriation of £2,834,120. A sum of £110,000 is absorbed by discount and issue expenses of £8,000,000 3½ per cent unsecured loan stock 1954/59 and the following transfers are made: £500,000 (nil) to general reserve, £100,000 (£500,000) to reserve against future stock depreciation, and £140,000 (£6,487) to reserve for increased cost of plant replacement. The ordinary dividend is maintained for the tenth successive year at 17½ per cent, including a cash bonus of 7½ per cent. A sum of £1,394,677 (£1,225,220) is carried forward.

The directors state that the improved results are due partly to the completion of remunerative contracts taken in previous years, and partly to a higher volume of turnover at a slightly lower rate of profit. There has been a definite falling off in orders for some products, notably those connected with the building industry, which has created production problems in the factories concerned. Greater turnover has been effected without further increase in the stocks and work in progress. Exports have again created a record and are considerably above the target figures fixed by the Government. The overseas companies have shown satisfactory results. Extensions at the company's heavy electrical and mechanical engineering works are in course of completion and the programme of plant re-equipment has been continued. Special notice has been given to move at the annual general meeting resolutions for the re-election as directors of Sir Harry Railing and the Earl of Clarendon who have both attained the age of seventy.

John Brown & Co., Ltd.—In the course of his speech at the annual meeting on 28th July, Lord Aberconway said that the company had been accepted by the British Electricity Authority as contractors for steam power plant. They had entered into an agreement with Mitchell Engineering, Ltd., for the use of their designs, and in this way it was hoped to accelerate considerably the company's progress in this field. The work which the company was doing in the manufacture of water turbines for hydro-electric schemes for Great Britain and for foreign countries was both substantial and continuous.

Electric Construction Co., Ltd.—At the annual meeting on 28th July, the chairman (Mr. W. M. Furniss) said that record trading had been achieved despite difficulties in export markets. The expansion in the home market had enabled them to keep in full production. The company was now operating a profit-sharing scheme which had already resulted in better work and time-keeping. Business with China had ceased but devaluation of sterling had helped them to obtain business in the hard-currency countries. There was a good opportunity to do business in the United States and good orders were still being obtained from Australia. Mr. E. W. Walker, a director, was now in Melbourne supervising a large rectifier installation which they had just delivered. Mr. J. Johnson Smith, their London manager, had been elected to the board.

E. K. Cole, Ltd.—Speaking at the annual meeting on 27th July, Mr. E. K. Cole, chairman and managing director, said that the accounts showed that the company had had a successful year. Although production had been increased they had been unable to meet the demand. The opening of new television transmitters should provide a steadily increasing demand. The electronics division had also made good progress and should expand. An order for their airborne radar search equipment had been received from the B.O.A.C. for installation in aircraft operated by the Corporation.

During the year an agreement had been completed with Thorn Electrical Industries, Ltd., whereby that concern acquired 51 per cent of the share capital of Ekco-Ensign Electric, Ltd. The production of lamps at Southend had been discontinued, but the company's Preston factory had been reorganized and continued in full operation. The Ekco-Ensign Company was maintaining its selling organization and independent sales policy. The arrangement with Thorn Elec-

trical Industries had already proved advantageous and Ekco-Ensign would benefit from the use of large-scale manufacturing techniques new to this country.

Trading conditions in the plastics industry had been difficult and though the turnover of the plastics division had been maintained this had been due largely to the expansion of the thermo-plastic section. The special products section, which made and marketed electric space heaters, was still affected by the onerous purchase tax, but a reasonable turnover was achieved in the domestic and marine fields. Exports reached a new record figure and relations with associated companies in India, South Africa and Ireland had been strengthened. The company's business had expanded very rapidly and during the current year it might become necessary to seek further permanent capital.

Oriental Telephone & Electric Co., Ltd.—A statement by the chairman (Mr. E. J. Bunbury) has been circulated in advance of the meeting on 16th August. In this it is said that satisfactory progress is now being made in Singapore. The Rangoon company, whose undertaking has been acquired by the Government of Burma, is in voluntary liquidation and a first payment of £22,905 has been received. Considerable progress has been made by the Hong Kong company which has made an issue of new capital.

British Electric Traction Co., Ltd.—Presiding at the annual general meeting on 27th July, Mr. H. C. Drayton, the chairman, stated that the company now has a substantial interest in the Broadcast Relay Service, Ltd., which had had another successful year. The Broadcast Relay Overseas Service, Ltd., had continued to go ahead and had paid its first dividend.

Hick Hargreaves & Co., Ltd., held their annual general meeting on 25th July. Mr. W. D'Arcy Madden, the chairman and managing director, said that the works were fully occupied with a heavy order book. The British Electricity Authority continued to be their principal customer, and they had recently received instructions for a quota of the condensing plant and feed heating equipment required by the power station programme for commissioning in 1955.

Globe Telegraph & Trust Co., Ltd.—Under a proposed scheme of capital reorganization the 6 per cent cumulative preference stock is to be replaced by an equal amount of 4 per cent debenture stock. In addition, the holders will receive either 10s ordinary stock for each £1 unit of preference stock held; or a further 10s 4 per cent debenture stock, plus a cash payment of 2s 6d for each £1 unit of preference stock held. The debenture stock is redeemable in 25-30 years. Ordinary stockholders, while retaining their existing stock, will receive in addition a bonus of 120 per cent, made up of 10s ordinary stock, 10s 4 per cent debenture stock and a cash payment of 4s for every £1 of ordinary stock held. The accounts for the year ended 30th June record a profit of £191,155 (compared with £185,484), after providing £153,917 (£151,158) for taxation.

Anglo-Argentine Tramways Co., Ltd.—At the annual meeting on 25th July, Mr. B. H. Binder, who presided, stated that the stipulated period for the sale of the Buenos Aires Transport Corporation's assets expired on 20th April without any sale having taken place. An Argentine Minister had, however, given the British Ambassador to understand that the whole problem of the Corporation was now being studied by his Government. Shareholders sanctioned a scheme extending the debenture moratoria.

W. & T. Avery, Ltd.—In his report to the annual general meeting on 25th July, Mr. W. H. Turner, chairman, stated that the demand for the company's products at home and overseas continued on a satisfactory level, though the expansion in production was at a higher rate than incoming orders. The products of Hussmann British Refrigeration, Ltd., continued to widen in variety to meet the special needs of each of the food trades.

Kalgoorlie Electric Power & Lighting Cpn., Ltd.—Presiding at the annual general meeting on 26th July, Mr. A. J. Fippard, the chairman, reported satisfactory progress on extensions at the generating station. Foundations for two new boilers had been completed, while shuttering for the third boiler was nearing completion. A considerable amount of boiler plant, together with economizers, had been delivered and the erection of the steel structure and drums of the first two boilers had been commenced.

The Delhi Electric Supply & Traction Co., Ltd., has postponed its meeting until the end of September owing to delays in settling a question relating to the taxation of the amounts to be received from the liquidation of the company.

Oldham & Son, Ltd., reports that the consolidated accounts show a gross profit for the ten months ended 31st March amounting to £242,394 (including £11,250 from Oldham & Son, Africa, Ltd.), compared with £283,683 in the preceding year. The net profit is £210,161 (£244,971). Taxes absorb £108,551 (£123,564), and a final dividend of 10 per cent brings the total ordinary distribution to 25 per cent, or at the rate of 30 per cent per annum. As the capital has been doubled by a share bonus, the effective rate of interest is the same as for 1948-49, when the dividends totalled 60

per cent. Mr. John Oldham, chairman, states that negotiations have been completed with the Indian Government for the establishment there of a company under the title of Oldham & Son, India, Ltd.

Scottish Cables, Ltd., show a trading profit of £273,901 for 1949-50, compared with £254,060. The net profit, after providing for taxation, is £115,355, against £104,822. A final ordinary dividend of 20 per cent is recommended, maintaining the total at 30 per cent. £65,000 (against £76,058) is put to general reserve and £21,730 (£17,575) is carried forward.

Laurence, Scott & Electromotors, Ltd., are placing on the market 50,000 unissued 4¼ per cent £1 cumulative preference shares. Half of these have already been placed and the remainder are offered at 20s 1½d free of stamp and fee.

Brush Electrical Engineering Co., Ltd.—The issue of new ordinary shares to existing shareholders, for which the closing date was 28th July, has been oversubscribed. Applications for excess shares to the value of £1,000 and over have therefore been scaled down.

The Palestine Electric Cpn., Ltd., is maintaining its dividend for the year at 5 per cent, tax free, on larger capital. The net profit for 1949, in Israeli currency, was £170,689 (against £97,511), after providing for all charges, including £380,000 (£60,000) for taxation and after placing £125,000 to general reserve.

The Nigerian Electricity Supply Cpn., Ltd., reports a net profit of £118,672 for the year ended 28th February, compared with £122,782 for the preceding year. Of this tax took £58,884 (£57,228). A final dividend of 4 per cent and a bonus of 2 per cent make 10 per cent for the year (same).

Telephone Properties, Ltd., made a net profit last year amounting to £36,612, compared with £24,056. It is proposed to increase the ordinary dividend from 6 to 7 per cent. In a circulated report, Sir Alexander Roger, the chairman, states that the Nacional Company of Venezuela, in 1949, added 4,858 stations to its telephone network. A vast rebuilding and development programme is in progress in Caracas, and it is impossible to foresee telephone saturation point.

Davey, Paxman & Co., Ltd., are maintaining their dividend at 10 per cent on larger capital.

Philips Incandescent Lamp Works (Eindhoven).—The operating balance for 1949 amounted to Fl.28,498,605 (Fl.23,081,679). The dividend on the ordinary capital is maintained at 9 per cent and Fl.204,682 (Fl.30,371) is carried forward.

NEW COMPANIES

Barron Electrical Co., Ltd.—Registered 18th July. Capital £1,000. To acquire the business of an electrical contractor carried on by S. S. G. Mugford at 33, Jubilee Road, Greenford, Middlesex, as "Barron Electrical Co." Permanent directors: S. W. H. Mugford and S. S. G. Mugford (chairman). Secretary: C. A. Wynne. Regd. office: 9, The Avenue, W. Ealing, W.13.

R. Gordon (Kingston), Ltd.—Registered 19th July. Capital £8,000. Refrigeration and cold storage engineers, electrical contractors, etc. The directors are: R. Gordon and Mrs. J. F. Gordon (secretary). Regd. office: 51, Cambridge Road, Kingston-on-Thames.

RECEIVER APPOINTED

Underwood (Electric), Ltd.—S. H. Gillett, 24, Basinghall Street, E.C., was appointed receiver on 15th July, under powers contained in debenture dated 16th October, 1947.

MEETINGS OF CREDITORS

L. Bunce (Electrical), Ltd.—Pursuant to Section 293 of the Companies Act, 1948, a meeting of creditors is to be held at the Dudley Arms Hotel, Market Place, Dudley, on 9th August.

Blythe & Marden, Ltd.—A meeting of creditors is to be held at the offices of Sprague, Nicholson, Morgan & Co., Ltd., 68-72, Horseferry Road, London, S.W.1, on 9th August.

LIQUIDATIONS

Riley & Peirson (Electrical), Ltd.—Winding up voluntarily. Liquidator, Mr. R. B. Smith, York House, 3, Alfred Street, Leeds, 1.

Wired Rediffusion Developments, Ltd.—Claims to the liquidator, Mr. F. Medlicott, 40, Woodville Gardens, London, W.5, by 31st August.

Volta Electric, Ltd. — Particulars of claims to the liquidator, Mr. E. D. Basden, 73, Basinghall Street, London, E.C.2, by 28th August.

BANKRUPTCIES

L. W. Aldis, electrical engineering contractor, Greengates, Top Street, Rattlesden, and previously Lyndhurst Cottage, Woolpit, both Suffolk.—First meeting held 1st August at 13a, Gt. Colman Street, Ipswich. Public examination 22nd September at the Guildhall, Bury St. Edmunds.

FINANCIAL SECTION

STOCKS and SHARES

THE news from Korea has done nothing to encourage Stock Exchange markets during the past week or, for the matter of that, for the past month. During the latter period, the shares in our price lists given overleaf show a majority of falls, due in most cases to the lack of interest which prevails at the present time and the caution with which investment regards the general outlook. In all the markets round the House, the complaint is the same—little turnover and little public interest. On the other hand, attention is turned to shares in companies likely to benefit by the extension of war.

G.E.C. Results

An 18 per cent increase in the General Electric Company's group profit for 1949-50 before tax, has recovered the ground lost in the previous period, so that the total of just under £4½ million is almost exactly the same as that recorded two years ago. Net profit after tax is up by more than £200,000 at £1.7 million. Maintenance of the ordinary dividend at 17½ per cent costs little more than £400,000 net, a disbursement which looks very modest against the earnings figures, and is, incidentally, nearly £2 million less than the U.K. tax-gatherer's portion. The price remains at 82s 6d.

Globe Telegraph & Trust

A capital reconstruction scheme for Globe Telegraph & Trust follows from reorganization of Cable & Wireless (Holding) in which the Trust was the principal stockholder. To judge from market reactions, it falls short of some ordinary stockholders' anticipations. Initial reaction was a drop in the price of the shares from 47s to 42s; on second thoughts, it revived to 43s 3d. Holders are offered, for each £1 stock held, a bonus of 10s new ordinary stock, plus 10s of a new 4 per cent debenture stock and 4s cash. Assuming a value of par for both the new stocks, the resultant holdings would together be worth 44s, and this is evidently being taken for the moment as roughly the basis for the market quotation of the existing ordinary. Recent speculative interest in the shares was expecting something more in the shape of cash.

Satisfaction has been expressed with the offer to Globe Telegraph 6 per cent preference stockholders under the new scheme. Their stock will be extinguished, and they are offered in exchange, for each £100 stock, either £150 of the 4 per cent debenture, plus 2s 6d per cent in cash, or £100 debenture plus £50 new ordinary stock. Income would be maintained as before, plus the cash bonus, under the first alternative, and possibly increased under the second, but without the cash. There has been little change in the price of the existing shares at 31s.

Oldham & Son's Dividends

Annual accounts just published by Oldham & Son cover a period of ten months to the new accounting date of March, and the dividends are paid on capital increased since last year by the 100 per cent share bonus. Adjusted in both cases to an annual basis, and, in the case of the dividend, to the present capital, profits increased moderately during the period, and the 25 per cent total distribution is equivalent in effect to the 60 per cent paid for the previous twelve months. The shares can properly be valued for yield purposes on a 30 per cent dividend basis, which is adopted in our accompanying lists. Reference in this connection is due to the yield shown on Telegraph Construction shares; it is based, conservatively, on the total of the 4 per cent final paid for 1949 and the 5 per cent interim for this year.

Matters of Moment

E. K. Cole's chairman gave notice at last week's meeting that further permanent capital may have to be raised in the current year to finance the increase in the company's business, for which he looks forward to some years of steady and satisfactory progress. Capital requirements were also mentioned at the meeting of Telephone Properties; the company has raised the ordinary dividend from 6 to 7 per cent. The price of the shares has risen 2s 6d, since a month ago, to 21s 3d. Decca shares are dull at 12s 9d on the statement from the board—declaring a second interim dividend of 20.5/6 per cent on the ordinary—that a considerable recession in profits may be shown for 1949-50. The directors add that the current year's combined turnover of the company and its subsidiaries is substantially higher than that of the corresponding period of the previous year. The fall of 9d on the month in Brush to 5s 3d is due to the issue of the new shares. The latter are quoted at 4½d premium. Walsall Conduits' production and sales, it was stated at the meeting, are 10 per cent above last year's corresponding figures. Lancashire Dynamo at 92s 6d are ex rights; the new shares are 12s premium.

Electrical Investments

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 31 July 1950	Month's Rise or Fall	Yield £ s. d.
Overseas Electricity Companies					
Atlas Elec. ...	2½	3	15/-	+6d.	4 0 0
Calcutta Elec. ...	6†	6†	21/6	−6d.	5 11 7
Cawnpore Elec. ...	13	10	45/-	−2/6	4 9 0
East African Power	7	7	33/9	−1/-	4 2 10
Jerusalem Elec. ...	5	6	13/6	—	—
Madras Elec. ...	8	5	27/6	−⅛	3 12 9
Nigerian Elec. ...	10	10	30/9	—	6 10 1
Palestine Elec. "A"	5†	5†	21/6	−6d.	4 13 0
Perak Hydro-Elec.	Nil	Nil	8/-	−6d.	—
Whitehall Inv. Pref.	6	6	23/6	—	5 4 4
Equipment and Manufacturing					
Aberdare Cables ...	15	20	55/9	+9d.	7 4 0
Aron Elec. Ord. ...	15	15	40/-	−⅛	7 10 0
Assoc. Elec. Ord. ...	15	15	76/6	—	3 18 6
Automatic Tel. & El.	12½	12½	57/6	−⅛	4 6 10
Babcock & Wilcox	15	15	63/-	+6d.	4 15 3
Baldwin, H. J (2/-)	25	25	5/9	—	8 13 10
British Aluminium	10	10	39/6	−6d.	5 1 3
B.I. Callender's ...	6⅜	6⅜	30/6	−9d.	4 7 0
British Thermostat (5/-)	25	30	28/9	+⅛	5 4 4
British Vac. Cleaner (5/-)	20	20	11/6	—	8 13 10
Brush Ord. (5/-) ...	10	10	5/3	−9d.	9 10 6
Burco (5/-) ...	35	35	20/-	—	8 15 0
Chloride El. Storage	20	12½*	52/6	—	3 16 3‡
Cole, E. K. (5/-) ...	20	20	15/6	−1/6	6 9 0
Cossor, A. C. (5/-)...	Nil	Nil	8/-	−6d.	—
Crabtree (10/-) ...	17½	17½	37/6	—	4 13 4
Crompton Parkinson Ord. (5/-) ...	22½	22½	11/6	−6d.	4 16 0‡
De La Rue (5/-) ...	50	50	22/6	−9d.	11 2 2
Decca (1/-) ...	112½	112½	12/9	−1/9	8 16 3
E.M.I. (10/-) ...	8	8	20/6	−2/-	3 18 1
Electrical Components (5/-) ...	20	20	11/3	—	8 17 10
Elec. Construction	12½	15	57/6	—	5 4 2
Enfield Cable Ord.	7½	7½	30/-	—	5 0 0
English Electric ...	10	10	45/6	—	4 8 0
Ericsson Tel. (5/-)...	20†	20†	45/-	−⅛	2 4 6
Ever Ready (5/-)	40	35	27/6	−1/-	6 7 3
Falk Stadelmann ...	15	15	33/9	−2/6	8 17 6
G.E.C. Ord ...	17½	17½	82/6	—	4 5 0
General Cables (5/-)	50	50	16/3	—	9 4 8‡
Greenwood & Batley	15	15	42/6	+⅛	7 1 2
Hackbridge Cable (5/-)	—	20	13/-	+1/-	7 14 0
Hackbridge Hewittic (5/-)	12½	15	13/6	−6d.	5 11 1
Hall Tel. Acc. (10/-)	10	10	14/-	—	7 2 10
Heatrae (2/-) ...	12½	12½	4/-	—	6 5 0
Henleys (5/-) ...	20	20	23/-	+6d.	4 7 0
Hoover (5/-) ...	40	45	44/-	—	5 2 0
Intl. Combustion (5/-)	37½	37½	16/-	—	4 13 9‡
Johnson & Phillips	15	15	60/-	—	5 0 0

Company	Dividend Previous	Dividend Last	Middle Price 31 July 1950	Month's Rise or Fall	Yield £ s. d.
Equipment and Manufacturing (continued)					
Lancashire Dynamo	22½	22½	92/6	−5/-	4 17 5
Laurence, Scott (5/-)	12½	12½	13/6	—	4 12 7
London Elec. Wire	10	10	47/6	—	4 4 2
J. Lucas	17½	17½	31/-	+1/-	3 14 3
Mather & Platt ...	11	11	35/9	−6d.	4 11 0
Metal Industries ...	10	10	43/3	−6d.	4 12 7
Mid. Elec. Mfg. ...	35	12½*	55/-	—	4 11 0
Murex	20	20	45/6	—	4 8 0‡
Newman Ind. (2/-)	17½	10	3/-	—	6 13 4
Oldham & Son (1/-)	60	60	5/-	−6d.	6 0 0‡
Plessey (5/-) ...	20	20	16/3		6 3 0
Parsons C. A. ...	12½	15	66/3	—	4 10 4
Pye Deferred (5/-)	25	35	31/3	−3/9	5 12 0
Radio & Tel. (2/-)	25	—	9d.	—	—
Revo (10/-) ...	27½	27½	40/-	−2/6	6 15 0
Revrolle	12½	15	68/9	—	4 7 3
Scophony Baird (1/-)	—	—	1/6	−3d.	—
Scot. Cable (4/-) ...	30	30	22/6	—	5 6 8
Siemens Ord ...	7½	7½	31/3	—	4 16 0
Switchgear & Cowans (5/-)	20	20	15/-	—	6 13 4
T.C.C. (10/-) ...	15	15	33/9	—	4 8 9
T.C. & M. ...	10	9*	38/3	+9d.	4 3 9‡
Telephone Mfg. (5/-)	9	10	10/-	—	5 0 0
Thorn Elec. (5/-) ...	25	20	17/6	—	5 14 3
Tube Investments	25	25	6⅛	⅛	4 2 3
Vactric (5/-) ...	Nil	Nil	7/6	—	—
Veritys (5/-) ...	5	2½	3/-	−6d.	4 3 4
Walsall Conduits (4/-)	70	70	57/-	−1/9	4 18 2
Ward & Goldstone (5/-)	50	44*	35/6	+6d.	5 12 8‡
Watford (2/-) ...	20	20	6/6	—	6 3 6
Westinghouse Brake	14	14	61/3	+⅛	4 11 6
West, Allen (5/-) ...	10	10	9/-	—	5 11 1
Transport and Communications					
Anglo-Am. Tel: Pref.	6	5⅓	95½	−5	5 18 0
Def.	—	—	16	−2	—
Anglo-Portuguese	8	8	25/6	—	6 5 6
Brit. Elec. Traction: Def. Ord. ...	50	32½*	435	−10	5 3 4‡
Calcutta Trams ...	Nil	6†	25/-	+6d.	4 16 0
Cape Elec. Trams	6	6	15/-	−2/6	—
Cable & Wireless: Ord.	—	—	93½	+½	—
4% Loan ...	—	—	101	—	3 19 8
Globe Tel. & Tel. Ord.	5†	5†	43/3	−3/-	—
Great Northern Tel. (£10)	11	7	13	−½	5 7 8
Inter. Tel. & Tel. ...	Nil	Nil	21	−2	—
Marconi Marine ...	7½	7½	23/9	−6d.	6 6 1
Oriental Tel. Ord.	16	16	40/-	−2/6	8 0 0
Telephone Props. ...	6	7	21/3	+2/6	6 11 9
Tele. Rentals (5/-)	10	10	11/-	−6d.	4 11 0

* After capital bonus.
† Dividends are paid free of Income Tax.
‡ Yield adjusted to capital bonus issue.

ELECTRICITY SUPPLY

Recent Power Station Contracts

Croydon Cooling Water

DURING the past month the British Electricity Authority has placed contracts for power station work, plant and equipment amounting in the aggregate to £2,296,981. They include foundations for Acton Lane "B" power station, Sir Robert McAlpine & Sons, Ltd.; and reinforced concrete cooling tower, J. L. Keir & Co. (London), Ltd. Demolition and reconstruction, York power station, Sir Robert McAlpine & Sons (Newcastle-upon-Tyne), Ltd. Superstructure, Uskmouth power station, John Morgan (Builders), Ltd.

New Power Stations

The consent of the Minister of Fuel and Power has been received to the development of the Carrington (Manchester), Braehead (Glasgow) and Doncaster power stations to their full capacity. The Minister's consent has already been given to the first stages of work at these stations. The present authorizations cover the installation of two 60,000 kW turbo-alternator sets and four 360,000 lb/hr boilers at Carrington, making the total installed capacity 240,000 kW; one 50,000 kW set and two 300,000 lb/hr boilers at Braehead, giving a total of 200,000 kW; and two 30,000 kW sets and four 180,000 lb/hr boilers at the new Doncaster station, which will have a total installed capacity of 120,000 kW.

Prepayment Meters

Seaham U.D.C. has asked the North Eastern Electricity Board to make greater use of slot meters in Council houses. The Council has pointed out that many tenants are not accustomed to paying big quarterly electricity bills and prefer the prepayment system. The Electricity Board has stated that quarterly meters will not be installed without the tenant's consent.

Discounts Abolished

Prompt payment discounts on electricity accounts in the Canterbury area are to be discontinued after many years. Reporting this to the City Council, Alderman A. Baynton, the Council's representative at Kent conferences with the South Eastern Electricity Board, said that he had protested but had been told that only 20 per cent of suppliers in the Board's area had allowed discounts, Gravesend and Sheerness being the only other towns in Kent in addition to Canterbury. The Council resolved to endorse the stand made by Alderman Baynton, although Councillor J. G. B. Stone described discounts as a "sop to those who were quite able to pay but would never part with their money until the last minute."

Water Supply Dispute

In the King's Bench Division last week Mr. Justice Lloyd Jacobs delivered his reserved judgment in the actions by John S. Deed & Sons, Ltd., and the New Merton Board Mills, Ltd., against the British Electricity Authority and the Croydon Corporation claiming an uninterrupted water supply from the River Wandle for the plaintiffs' works at Morden. Plaintiffs claimed an injunction to restrain Croydon Corporation and the B.E.A. from diverting or interfering with their use of sewage effluent entering the river. His Lordship found against the plaintiffs' claim and gave judgment for defendants with costs.

Cost of Traction Supplies

The Bradford city treasurer, Mr. J. Ruscoe, in his report on the accounts of the Corporation Transport Department, says that the cost of power for trams and trolleybuses was £16,773 and £89,212 respectively. It is to be hoped, he says, that the efforts of the manager may secure for Bradford some relief from what appears to be a somewhat penal rate of charge for current consumed.

Electricity Deposits

Comments on the security deposits held by Electricity Boards are replied to by Mr. A. L. Burnell, secretary of the South Eastern Board, in a letter to the local Press. He states that since nationalization his Board has reduced the amount of deposits held in the Croydon and West Kent Sub-Area from £53,179 to £14,016. The policy of crediting deposits wherever the consu-

mer's record of payment justifies such a course is sound commercially because the Board is required by statute to pay 4 per cent per annum on such deposits and can obtain capital more cheaply in other ways.

Increased Charges for Supply

Whitehaven Town Council is protesting to the North Western Electricity Board against increased charges for supplying electricity to dwellings. Ald. McAllister said the Board was flouting the spirit and letter of what nationalization stood for. The cost of supplying electricity to houses was a liability which the Board should bear. The Council decided to protest against the higher charges, but rejected a motion by Ald. McAllister that it should refuse to pay the increase.

Support for Welsh Scheme

The Industrial Association of Wales and Monmouthshire is to give full support to the proposed construction of new hydro-electric generating stations in North Wales. Making this announcement after a Council meeting, the Association states that it has heard objections to the scheme as explained by Mr. Clough Williams-Ellis and it has received also an assurance from a representative of the British Electricity Authority with regard to the safeguarding of amenities.

Seaside Illuminations

The illuminations at Morecambe and Heysham, which are stated to have cost £80,000 and to include some of the largest set pieces ever made, are to be switched on by Mr. George Formby on 25th August.

Hastings Town Council has agreed to spend £10,000 mainly on a scheme of permanent electrical illuminations in connection with the Festival of Britain.

House Services

Margate Town Council has decided that unless a gas main is laid to the Ramsgate Road housing estate without further delay all houses will be serviced by electricity. It is stated that the cost would be £510 for 70 houses, this sum including the conversion of those already connected to gas services.

Rural Supplies

At a meeting of the St. Germans R.D.C. it was reported that the South Western Electricity Board had written stating that St. Dominick was included in plans for the provision of a supply by 1951, and Landulph, St. Mellion and Botus Fleming were scheduled for 1951-52, though capital might not be available. Colyton Parish Council has been informed that as a result of discussions regarding the acquisition of the undertaking of Messrs. Hann, the Board now hopes to proceed with a scheme to supply electricity to the village from its system.

Second Staythorpe Set

The second 60,000 kW turbo-generator at the new Staythorpe power station (B.E.A. East Midlands Division) has recently been put on commercial load.

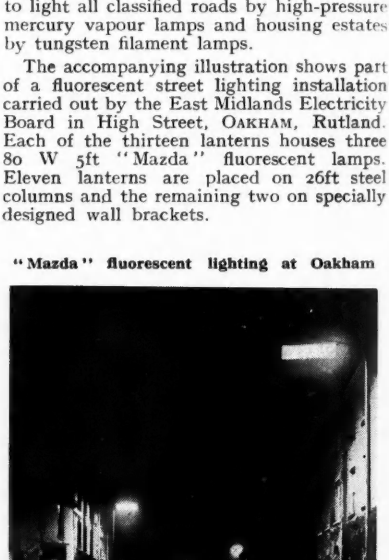
PUBLIC LIGHTING

SUBJECT to consent to borrow £20,750 being granted by the Ministry of Health, TIPTON Council is to accept the quotation of the Midlands Electricity Board for the supply and installation of the necessary equipment for lighting the various main traffic roads in the borough.

Although the full scheme for conversion from gas to electricity street lighting has not yet received Ministry of Transport approval, the ST. IVES, Hunts, Council is to light all classified roads by high-pressure mercury vapour lamps and housing estates by tungsten filament lamps.

The accompanying illustration shows part of a fluorescent street lighting installation carried out by the East Midlands Electricity Board in High Street, OAKHAM, Rutland. Each of the thirteen lanterns houses three 80 W 5ft "Mazda" fluorescent lamps. Eleven lanterns are placed on 26ft steel columns and the remaining two on specially designed wall brackets.

"Mazda" fluorescent lighting at Oakham



NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

22502. Marconi's Wireless Telegraph Co., Ltd.—Phosphors. 14th November, 1944. (642701.)

23659. British Thomson-Houston Co., Ltd.—Electric-discharge devices. 27th November, 1944. (642702.)

1945

9091. British Thomson-Houston Co., Ltd. (General Electric Co.).—Anode structures for magnetrons. 11th April, 1945. (642703.)

1946

9350. British Thomson-Houston Co., Ltd.—Testing apparatus. 26th March, 1946. (642887.)

23001. Western Electric Co., Inc.—Moisture-resistant coating and method of producing it. 1st August, 1946. (642892.)

31049. Igranic Electric Co., Ltd.—Apparatus for the control of energy supplied to an electrical translating device. 18th October, 1946. (642895.)

1947

675. British Thomson-Houston Co., Ltd.—Clothes washing machines. 8th January, 1947. (Addition to 625324.) (642899.)

1567. Hart, G. W.—Scanning aerial equipment for radio distance-finding and like apparatus. 17th January, 1948. (642825.)

2310. Cossor, Ltd., A. C., and Dunthorne, J. D.—Cathode-ray tubes. 15th January, 1948. (642719.)

8672. Shardlow Electric Wires, Ltd., Hargreaves, F. G., and Hargreaves, L. S.—Apparatus for controlling and/or indicating variation in the thickness of material. 21st July, 1948. (642903.)

10257. Commercial Ignition Co., Ltd., and Fulkes, L. P.—Relays. 12th March, 1948. (642727.)

13232. Standard Telephones & Cables, Ltd.—System for storing and retransmitting telegrams in automatic teleprinter exchanges. 16th May, 1947. (642729.)

13779. British Thomson-Houston Co., Ltd.—Voltage modifying circuits. 22nd May, 1947. (642730.)

13780. British Thomson-Houston Co., Ltd.—Volume controlling electron-discharge amplifiers. 22nd May, 1947. (642731.)

15011. Westinghouse Electric International Co.—Magnetic sheet material having an insulating coating. 6th June, 1947. (642734.)

15277. British Thomson-Houston Co., Ltd.—Radio-frequency testing apparatus. 10th June, 1947. (642735.)

15629. Philips Lamps, Ltd.—Circuits for charging or discharging condensers. 13th June, 1947. (642910.)

21278. Sylvania Electric Products, Inc.—Luminescent materials. 5th August, 1947. (642742.)

21964. Heinemann Electric Co.—Trip-free electric circuit-breakers. 8th August, 1947. (642923.)

21991. India Rubber, Gutta Percha and Telegraph Works Co., Ltd., Hawley Products, Ltd., Puffet, W. W., and Lewin, A.—Porous pots for primary electric cells. 30th August, 1948. (Cognate application 22684, 27th August, 1948.) (642744.)

22046. Allis-Chalmers Manufacturing Co.—Metal vapour electric discharge device. 8th August, 1947. (642745.)

22276. Rauland Corporation.—Television and like systems and apparatus. 11th August, 1947. (642954.)

22277. Rauland Corporation.—Television and like systems and apparatus. 11th August, 1947. (642955.)

22607. Collins, A. F.—Refrigerating apparatus. 4th August, 1948. (642924.)

22653. Rauland Corporation.—Television and like systems and apparatus. 14th August, 1947. (642956.)

26940. British Thomson-Houston Co., Ltd.—Electromagnetic clutches. 7th October, 1947. (642749.)

27173. Parsons & Co., Ltd., C. A., and Martin, A. E.—Infra-red gas analyzing apparatus. 6th October, 1948. (642750.)

29117. General Electric Co., Ltd., Ledger, R., and Platt, A. D. B.—Electric traction drives. 28th October, 1948. (642753.)

29854. Philips Electrical, Ltd. — Manufacture of oxide cathodes for electric-discharge tubes. 10th November, 1947. (642755.)

31561. Philips Electrical, Ltd.—Frequency-stabilization of oscillators. 28th November, 1947. (642757.)

32036. Standard Telephones & Cables, Ltd.—Radio position indicating system. 4th December, 1947. (Addition to 623188.) (642761.)

32224. Moravian Electrical Engineering Works National Corporation, and Klima, V.—Method of regulating a shunt commutator motor. 6th December, 1947. (642763.)

33303. Philips Electrical, Ltd. — Magnetron cavity structures. 17th December, 1947. (642766.)

1948

73. British Thomson-Houston Co., Ltd.—Magnetrons. 1st January, 1948. (642931.)

1446. British Thomson-Houston Co., Ltd.—Magnetic cores. 16th January, 1948. (642778.)

1845. Philips Electrical, Ltd.—Circuits for demodulating frequency-modulated oscillations. 21st January, 1948. (642782.)

5394. Stevenson, B.—Inserts for boxes for containing electric flat irons or the like. 24th February, 1949. (642838.)

5833. General Electric Co., Ltd., Rycroft, J. L., and Sowter, A. B.—Utensils. 27th January, 1949. (642792.)

6449. Lange, E., and Segal, M.—Electric circuit breakers having arc-extinguishing means. 1st March, 1948. (642794.)

6867. Standard Telephones & Cables, Ltd., and Heaton-Armstrong, L. J.—Electric wave amplifiers. 4th March, 1949. (642842.)

7591. British Thomson-Houston Co., Ltd.—Frequency-control systems for magnetron oscillators. 12th March, 1948. (642932.)

7605. Crompton Parkinson, Ltd.—Rail vehicles and chassis therefor. 12th March, 1948. (642843.)

7613. Philips Electrical, Ltd.—Superheterodyne mixing circuits. 12th March, 1948. (642796.)

8690. Sanders (Electronics), Ltd., W. H., and Sproule, R. A.—Apparatus for controlling or indicating the level of an electrically conducting liquid in a container. 23rd March, 1949. (642933.)

9823. Liverpool Electric Cable Co., Ltd., and Frost, J. T.—Holders for use in the packaging of materials in coiled, rolled or like formation. 16th April, 1949. (642982.)

11873. E.M.P. Electric, Ltd., Miles, W. W. J., and Humphreys, I. E.—Electric fuses. 13th April, 1949. (642990.)

13250. Miller, C.—Bonding devices for electric cables. 13th May, 1949. (642996.)

13859. Wembley Electrical Appliances, Ltd., and Robertson, J. C.—Stands for lamps. 23rd May, 1949. (642935.)

13999/0. Indestructible Paint Co., Ltd., Pye, C. R., and Bremer, H. F.—Electrically insulating coating compositions. 13th May, 1949. (642816/7.)

14348. General Electric Co., Ltd., Adams, B. F.,

Bagnall, B., and Caddell, P.—Electric heating elements for solder pot or like thermal release devices. 27th May, 1949. (642849.)

18433. Linde Air Products Co.—Fusion-deposition welding. 8th July, 1948. (642854.)

18574. General Electric Co., Ltd., and Bryden, J. E.—Phase multiplying devices. 13th June, 1939. (Cognate application 25141, 27th September, 1948.) (642855.)

19918. Aero Pipe & Glass Co., Ltd., and Julius, W. O.—Refrigerating apparatus. 20th April, 1949. (Cognate application 20135, 28th July, 1948. (642857.)

20273. Gillott Electro Steam Cookers, Ltd., and Barton, A. V.—Electrically heated tanks for heating and melting substances. 15th July, 1949. (642858.)

21347. Fry, A., and Fry, F. A.—Electrical apparatus and windings therefor. 2nd July, 1949. (642860.)

21512. McDonald, J.—Electrode boilers. 15th August, 1949. (642862.)

24073. Pirelli-General Cable Works, Ltd.—Methods for soldering aluminium or aluminium alloys and soldering materials therefor. 14th September, 1948. (642869.)

33293. Teddington Controls, Ltd., Hawkins, A. S., and Hunt, C. L.—Electric time switches. 21st December, 1949. (642878.)

1949

16106. Commercial Ignition Co., Ltd., and Fulkes, L. P.—Control of electric motors for operating sliding windows and the like. 12th March, 1948. (Divided out of 642727.) (642760.)

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from the dates stated:—

19th July

HOTPOINT. No. 687,759. Class 7. Dish washing machines, ironing machines, clothes wringing machines, knife sharpening machines, potato peeling machines, food mixing machines, and garbage disposal devices for attachment to sinks for the comminution and disposal of refuse, all electrically operated. Also No. 687,760. Class 9. Electric flat irons, vacuum cleaning machines, and polishing machines for domestic purposes.—Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

SILOVAC and SILOLUXE. No. 687,459. Class 9. Electric vacuum cleaners.—C.C.A. (Vacuum Cleaners), Ltd., 109, South Street, Ponders End, Enfield, Middx.

26th July

OTTER. No. 684,747, Class 9. Electric switches and parts thereof included in Class 9.—Otter Controls, Ltd., Queen's Building, St. Peter's Square, Stockport.

MONOTRON. No. 686,264, Class 9. Mechanisms embodying manometric and electronic apparatus for use in supervising or controlling the operations of machinery.—B. G. (London), Ltd., 17, Stratford Place, London, W.1.

NINE LIVES (design). No. 686,565, Class 9. Electric dry batteries.—Union Carbide & Carbon Corporation, New York. Address for service: c/o Marks & Clerk, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

WESTREX (design). No. 687,700, Class 9. Sound recording and reproducing installations, instruments and apparatus.—Westrex Corporation, New York. Address for service: c/o F. C. Tomlins, 5, Mornington Road, Woodford Green, Essex.

STELLITE. No. 688,053, Class 9. Welding electrodes.—Deloro Stellit, Ltd., Highlands Road, Shirley, Birmingham.

FLAMGUARD. No. 667,681, Class 11. Electric fires and guards being parts thereof.—F. Turnbull, Lotus Works, Heigham Road, East Ham, London, E.6.

MEICO CATHOLIER. No. 674,731, Class 11. Fluorescent and cold cathode lighting fittings (other than electric starting apparatus for discharge lamps).—Micramatic, Ltd., 9, Cavendish Square, London, W.1.

PRESIDENT. No. 686,454, Class 11. Refrigators and parts thereof included in Class 11.—President Consolidated, Ltd., Sydney, N.S.W. Address for service: c/o Eric Potter & Clarkson, 4-5, Staple Inn, London, W.C.1.

RANALAH (two designs). Nos. 687,428-9, Class 11. Heating and drying apparatus, all included in Class 11.—Ranalah, Ltd., Ranalah Works, Lutterworth Road, Burbage, Hinckley, Leics.

DIACOOLER. No. 688,820, Class 11. Cooling machines and installations.—C. G. Hibbert & Co., Ltd., 6, Duke Street, London, S.W.1.

HOTPOINT. No. 687,762, Class 14. Clocks.—Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

SINTOX. No. 687,996, Class 17. Electric insulating material and insulator parts, all made principally of alumina.—Lodge Plugs, Ltd., St. Peter's Road, Rugby.

Laboratory Technicians

REGULATIONS and syllabuses have been adopted recently by the City and Guilds of London Institute for the Laboratory Technicians' Intermediate Certificate Examination; they come into force in the academic session 1950-51.

This scheme, prepared by the Institute's Advisory Committee on Laboratory Technicians' Work, is intended to meet the requirements of schools, technical colleges, universities, industrial organizations and research associations.

It is expected that candidates for the examination will normally come forward after completion of a course at a technical college or their place of employment, or partly at both. Provision is also made for the entry of external candidates. The course of part-time instruction proposed is of three years' duration, and teachers are free to arrange the order of the work. The examination set at the end of the course will be held annually, the question papers and practical examinations being set by the Institute's chief examiners. It is proposed that the scheme of examination should be reviewed after it has been in operation for three years.

Demand for Telephones.—During the last year 528,500 new telephones were installed but although this was at a greater rate than pre-war the waiting list has continued to increase and now stands at over 550,000.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Altrincham. — 18th August. Corporation. Trunk road lighting. (See this issue.)

Argentina.—22nd August. Director-General of Water and Electric Power. Ten diesel-electric d.c. generating sets (25 to 100 kW). (C.R.E. (I.B.) 59774/50. Ten/1464/I.B.3.)

Australia. — QUEENSLAND. — 22nd September. Brisbane City Council. Various types and lengths of 11 kV and 660 V p.i.l.c. cables and jointing material. (C.R.E. (I.B.) 59978/50. Ten/1468/I.B.2.)

7th September. 33 kV lead-covered cables. (C.R.E. (I.B.) 59151/50. Ten/1437.)*

12th October. City Electric Light Co., Ltd., Brisbane. 33kV metal-clad outdoor type reactors. (C.R.E. (I.B.) 59985/50. Ten/1478/I.B.1.)*

VICTORIA.—27th September. State Electricity Commission. 6.6 and 22 kV distribution transformers. (See 28th July issue.)

Basingstoke.—22nd August. Park Prewett Group Hospital Management Committee (South West Metropolitan Region). Supply of electric lamps to the hospital for six months from 1st October, 1950. Particulars (stamped addressed envelope required) from F. Hales, Secretary to the Committee, Park Prewett Hospital, Basingstoke, Hants.

Belfast.—1st September. Corporation Electricity Department. Cables for first stage of 33 kV distribution system extensions. (See 28th July issue.)

Bournemouth.—8th September. Corporation. Traffic signals. (See 28th July issue.)

Dagenham.—31st August. Borough Council. 660 V and 250 V underground cable. (See this issue.)

Egypt.—7th September. Director-General, Cairo Electricity and Gas Administration. Transformers. (See 28th July issue.)

Gateshead.—Education Committee. Electrical installation at new technical college. R. W. Gregory & Partners, Pilgrim House, Newcastle-on-Tyne.

Ilkley.—21st August. U.D.C. Street lighting equipment. (See 28th July issue.)

India.—NEW DELHI.—9th September. Director-General of Industries and Supplies. Electric cranes. (C.R.E. (I.B.) 58779/50. Ten/1429.)*

Irish Republic.—DUBLIN.—30th August. Port and Docks Board. Electric cranes. (C.R.E. (I.B.) 58871/50. Ten/1428.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Jarrow-on-Tyne.—Town Council. Electrical installation in block of 84 flats in Albion Street. Borough engineer, Town Hall, Jarrow.

Leeds.—10th August. City Council. Maintenance work, including electrical engineering work, on housing, education and other properties, from 1st October, 1950, to 31st March, 1951. Director of Works, Sweet Street, Leeds, 11.

Merton and Morden.—29th August. U.D.C. Stage lighting at Merton Public Hall. (See this issue.)

Nuneaton.—10th August. Corporation. Street lighting columns. (See 28th July issue.)

Preston.—Corporation. Electrical installation in Grange County Primary School. (See 28th July issue.)

St. Albans.—21st August. R.D.C. Street lighting equipment. (See 28th July issue.)

South Africa.—BLOEMFONTEIN.—17th October. City Council. Two stoker-fired boiler units and other plant. (C.R.E. (I.B.) 59548/50. Ten/1455.)*

Stockport.—25th August. General Purposes Committee. Supply of (1) time switches; (2) lanterns, chokes and capacitors for 80 W mercury vapour lighting; and (3) reinforced concrete lighting columns. (See this issue.)

Swinton & Pendlebury.—26th August. Corporation. Concrete columns, lanterns, lamps, etc., for lighting Manchester-Chorley road. (See this issue.)

Uruguay.—9th January, 1951. Usinas Electricas y Telefonos del Estado. Telephone equipment. (C.R.E. (I.B.) 60280/50. Ten/1483/I.B.2.)*

ORDERS PLACED

Berwick-on-Tweed.—Corporation. Wiring of 300 pre-war Council houses.—Radel Electrical Co.

London.—POPLAR.—Borough Council. Electrical installation at a block of 12 three-storey flats in Glengall Grove (£499).—London Electricity Board.

Newcastle-on-Tyne.—Education Committee. Alternator for electrical engineering department at King's College (£426).—Mawdsleys, Ltd.

Electrical installation at new premises being built in Claremont Road, Newcastle-on-Tyne, for the Council of King's College.—Watson-Norie, Ltd.

Reading.—Corporation Education Committee. Installation of electricity at Norcot Special School (£426).—Blakemore Morgan, Ltd., Henley-on-Thames. Whitley Special School (£432).—Butcher & Sons, Reading.

Wick.—Town Council. Electrical installations in 28 houses, East Banks site.—Miller & Tait, Edinburgh.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alperton.—Reinstatement of factory for Ministry of Works; W. S. Try, Ltd., builders, High Street, Cowley, Uxbridge.

Beckenham.—Dwellings (80), Oak Lodge estate, West Wickham; borough engineer.

Bersham (Denbighshire).—Pithead baths and first-aid centre for National Miners' Welfare Council; John Hughes (Contractors), Ltd., Holt Street, Wrexham.

Birmingham.—Scheme for four blocks of 12-storey flats, Great Francis Street and Great Lister Street Junction (£760,760); town clerk, The Council House.

Bristol.—Rebuilding departmental store, Queen's Road; B. Maggs & Co., 68, Queen's Road.

Broomhill (Northumberland).—Pithead baths at Broomhill Colliery for National Miners' Joint Welfare Council; R. Carse and Son, Ltd., builders, Oldgate, Morpeth.

Darlington.—Offices for the National Assistance Board; R. Blackett and Son, builders, Bondgate, Darlington.

Denton.—Houses (32) for U.D.C.; Vessey Bros. (Contractors), Ltd., St. Martins Road, Marple.

Douglas (I.o.M.).—Block of shops and offices, Duke Street and Lord Street; Manx Co-operative Society, Ltd., 15, Duke Street.

Dudley.—Adaptation of Albert House as home for aged; Darbey Bros. (Sedgeley), Ltd., Bilston Street, Sedgeley.

Durham.—Office and canteen block at Coxhoe for the Steetley Co., Ltd.; Gordon Durham and Co., builders, East Boldon, Co. Durham.

Additions to the Langley Park modern school (£40,000); R. Gallacher, Ltd., builders, Blackhill, Co. Durham.

Felling-on-Tyne.—Additions to factory in Abbotsford Road for the Stoneygate Flooring Co., Ltd.

Hereford.—Flats (68), Holme Lacy housing site; city surveyor.

Bakery and dairy, Holmer Road; Hereford Co-operative Society, Ltd., Widemarsh Street.

Hinckley.—Houses (144), various sites, for U.D.C.; Hinckley & District Builders' Federation.

Hornsey (Middlesex).—Rebuilding departmental stores, Crouch End, for James H. Wilson, Ltd., drapers and furnishers; J. S. Beard, architect, 101, Baker Street, London, W.1.

Huddersfield.—In our issue of 7th July we gave the name of Mr. H. Nuttall as the responsible officer for an extension to the Technical College. We are informed that all architectural work for the Education Authority is under the control of Mr. G. Crossley, education architect.

Isle of Grain (Kent).—New oil refinery (£15,000,000) for the Anglo-Iranian Oil Co., Ltd.; Sir Robert McAlpine and Sons, Ltd., contractors, 80, Park Lane, London, W.1.

London.—Blackheath.—Block of flats, 25/35, Lee Terrace; Jones, Lang & Wootton, 16, King Street, E.C.2.

Edmonton.—Works extensions; Universal Postal Frankers, Ltd., Eleys estate, Angel Road.

Lewisham.—Reconstruction of laundry, for Chislehurst Laundry, Ltd.; J. A. Lauchlan, architect, Central Parade, Orpington.

Longbenton.—Houses (350) for U.D.C.; A. E. Sweetman, surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne.

Luton.—Depot for Road Haulage Executive; H. A. Wells, architect, 18, Thorpe Road, Norwich.

Maidenhead.—Dwellings (42), in seven blocks, Curls Lane estate; C. T. Read, borough surveyor, 14, Craufurd Rise.

Newburn-on-Tyne.—Houses (48) on the Mount Pleasant estate, for the U.D.C.; builders: J. E. Harrison, Western Avenue, Lemington (24) and J. W. Vickers, Plummer Street, Newcastle (24).

Factory additions for J. Rowell and Son, engineers, Boyd Street, Newcastle.

Nottingham.—Hall of residence (£222,698) for the university authorities; Turley and Williamson, architects, 14, Eldon Place, Newcastle-on-Tyne.

Oldham.—Occupational centre, Cardwell Street (£23,500); A. L. Hobson, borough surveyor, 75, Union Street.

Preston.—Houses (98), Ribbleton Hall estate; borough surveyor, Municipal Building.

Prudhoe-on-Tyne.—Houses (130), Oaklands site; U.D.C. surveyor.

Reading.—Industrial development, Elgar Road; Robert Cort & Sons, Ltd., Reading Bridge Ironworks.

Scunthorpe.—Technical College buildings, including engineering and building block, canteen, boiler house, etc., Kingsway, for Lindsey C.C.; county architect, Lincoln.

Stockport.—Extensions to Stockport College, Hempshaw Lane annexe; Cruikshank & Seward, architects, 16, Princess Street, Manchester.

Houses (42), Windmill Lane & Matlock Road; H. Owen & Son, Ltd., Stockport.

Tipton.—Offices, Bagnall Street; John Cashmore, Ltd., Eagle Works, Great Bridge.

Wakefield.—Factory extensions at Piccadilly, for I. Goldstone (Leeds), Ltd.; Simpson & Moxon, architects, Southgate Chambers.

Wallsend.—Houses (20), Station Road; N. Willis, builder, Shields Road, Newcastle-on-Tyne.

Factory extension, Stephenson Street, for Cookson's Lead and Antimony Co., Ltd.; C. S. Errington, architect, 46, Grainger Street, Newcastle-on-Tyne.

Walsall.—Factory, Darlaston Road; J. Golcher, Ltd., stampers, Wednesbury, Staffs.

Washington (Co. Durham).—Council offices for the U.D.C. (£35,000); David Glen, Ltd., builders, Albert Road, Jarrow.

Wednesbury.—County primary school, Old Park Road; A. C. H. Stillman, county architect, Green Hall, Lichfield Road, Stafford.

Whitehaven.—Large factory extensions, for Marchon Products, Ltd.; R. Ward and Partners, architects, 33, St. George's Drive, London, S.W.1.